INTERNATIONAL WORKSHOP ON RESILIENCE RESEARCH

Cooperative Center for Resilience Research (CCRR)
National University of Mongolia, Nagoya University (Japan)

PROGRAM

10:50-17:00 Monday,16 May

Fresh Water Resources and Nature Conservation Center, Ulaanbaatar

10:50-11:00

BATTULGA Sukhee (CCRR, NUM), Yasuhiro SUZUKI (CCRR, Nagoya Univ.)
Opening Remarks

11:00-11:25

1. CHULUUN Togtokh (Director of Institute for Sustainable Development, NUM):

   "Resilience in Mongolia: History and Future"
   (Монголын сэргэн хөгжихүй: Өнгөрсөн ба ирээдүй)

11:25-11:50

2. MYAGMARTSEREN Purevtseren (Head of Department of Geography, NUM):

   "Urban spatial and demography dynamics of Ulaanbaatar city"
   (УБ хотын хүн амын шилжилт хөдөлгөөн ба орон зайн тэлэлт)

11:50-12:15

3. Yasuhiro SUZUKI (Nagoya Univ.)

   "Problems associated with the 2016 Kumamoto earthquake"
   (2016 оны Кумамотогийн газар хөдлөлтийн хохирол ба эрсдэлээс хамгаалах асуудал)

12:15-13:15 Commemorative Photographs & Lunch time

13:15-13:40

4. SERGMYADAG Dalai (Disaster Research Institute, National Emergency Management Agency):

   "Current status of Earthquake Disaster Risk Reduction in Mongolia"
   (Газар хөдлөлтийн гамшгийн эрсдэлийг бууруулах үйл ажиллагааны өнөөгийн байдал)

13:40-14:05

5. MINJIN Tserenbaltav (Law Enforcement University):

   "Features of the Nomads and Mongolian tradition of environmental protection"
   (Нүүдэлчдийн онцлог хийгээд Монголчуудын байгаль хамгаалж ирсэн уламжлал)

14:05-14:30

6. IRMUUNZAYA Khurtsbaatar (Fresh Water Resources and Nature Conservation Center)

   "Assessing water quality of Sugnugur, Gatsuurt and Kharaa rivers using macro-invertebrate communities"
   (Сөгнөгөр, Гацуурт, Хараа голуудын усны чанарыг макро-сээрнуруугүйтний бүлгэмдлээр тодорхойлох нь)

14:30-14:50 Coffee Break

14:50-15:15

7. ARIUNAA Chadraabal (National Emergency Management Agency):

   "Adaptation or Resilience for Dzud Mitigation in Mongolia"
   (Монгол орны Зудыг даван туулах асуудал)

15:15-15:40

8. TULGA Mendjargal (Ministry of Environment, Green development and Tourism):

   "Development of on- and off-grid renewable energy in Mongolia"
   (Дахин сэргээгдэх эрчим хүчийг ашиглах боломжийн тухай)

15:40-16:05

9. ENKHMANDAKH P (Ministry of Construction and Urban Development):

   “Problems associated with urban planning of Ulaanbaatar”
   (Улаанбаатарын хот төлөвлөлтийн асуудал)

16:05-16:35

Discussion

(Yasuhiro SUZUKI, Tetsuya INAMURA, Shinsuke TOMITA, Shoko ISHI)

16:35-16:45

BATTULGA Sukhee, Yasuhiro SUZUKI (CCRR)

Closing Remarks

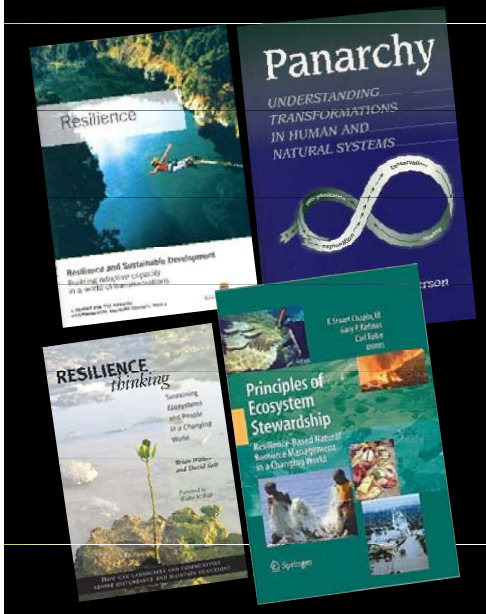
Resilience in Mongolia: History and Future

T. Chuluun, Director
Institute for Sustainable Development
National University of Mongolia

Content

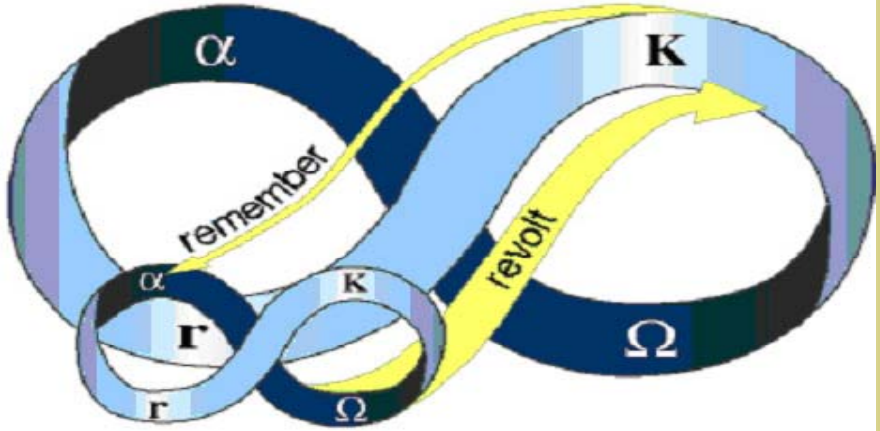
- Resilience concept
  - The Earth System
- Principles for building resilience
- Green Development Policy as resilience policy
  - Urban development
  - Pastoral system
- Summary notes
  - *Did Mongolia have resilience in the past?*
  - *What future implications can we expect from application of resilience concept for Mongolia?*

Resilience – Three features



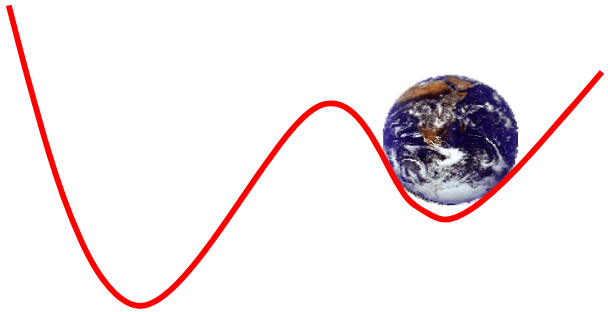
1. PERSISTENCE in the face of change, buffer capacity, withstand shocks
2. ADAPTABILITY the capacity of people in a social-ecological system to manage resilience e.g. through collective action
3. TRANSFORMABILITY the capacity of people in a social-ecological system to create a new system when ecological, political, social or economic conditions make the existing system untenable

Сэргэн хөгжихүйн онол (Resilience)

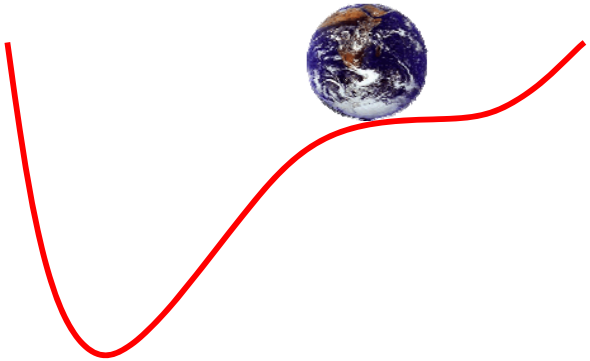


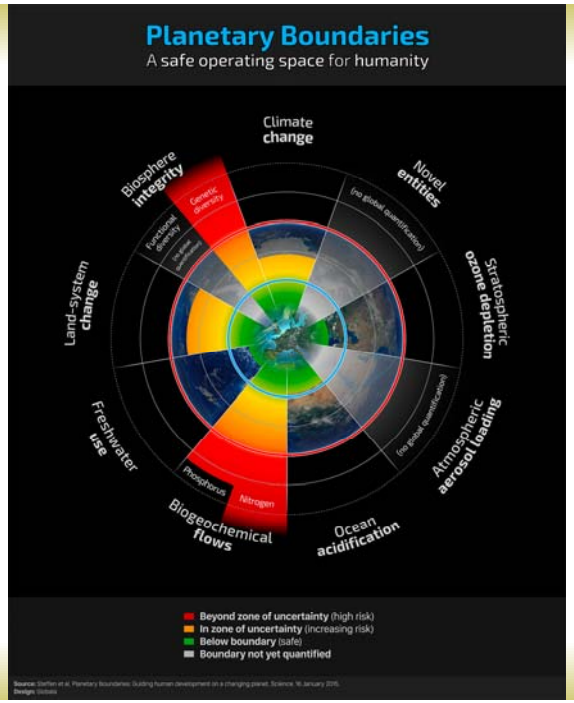
Өсөлт (r); Хөгжил (K); Уналт (); Шинэчлэл ()
Ой санамж (remember), сүйрэл (revolt)

A resilient (sustainable) Earth System

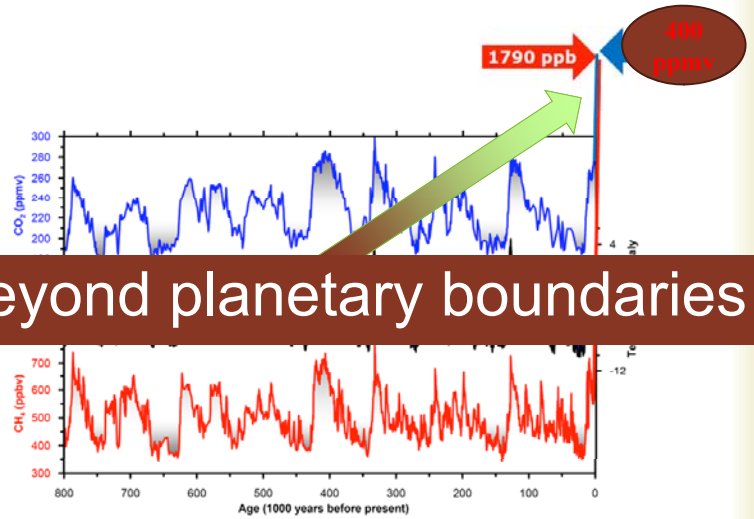


Reduced resilience – our precarious predicament





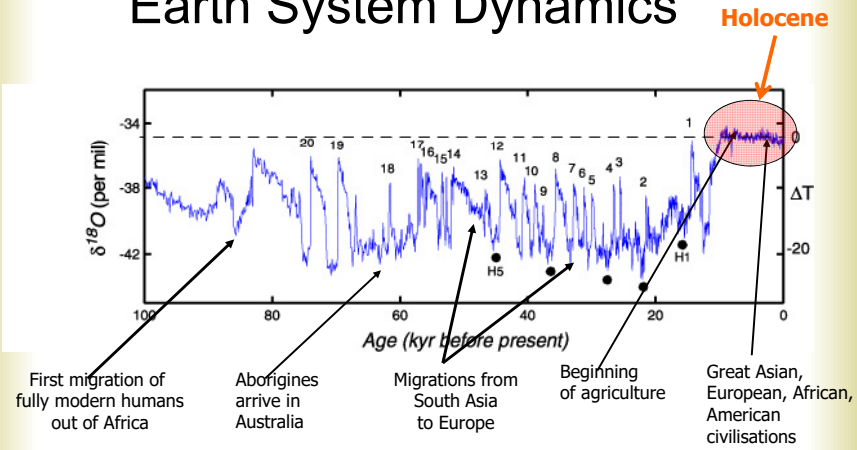
Greenhouse gas in the



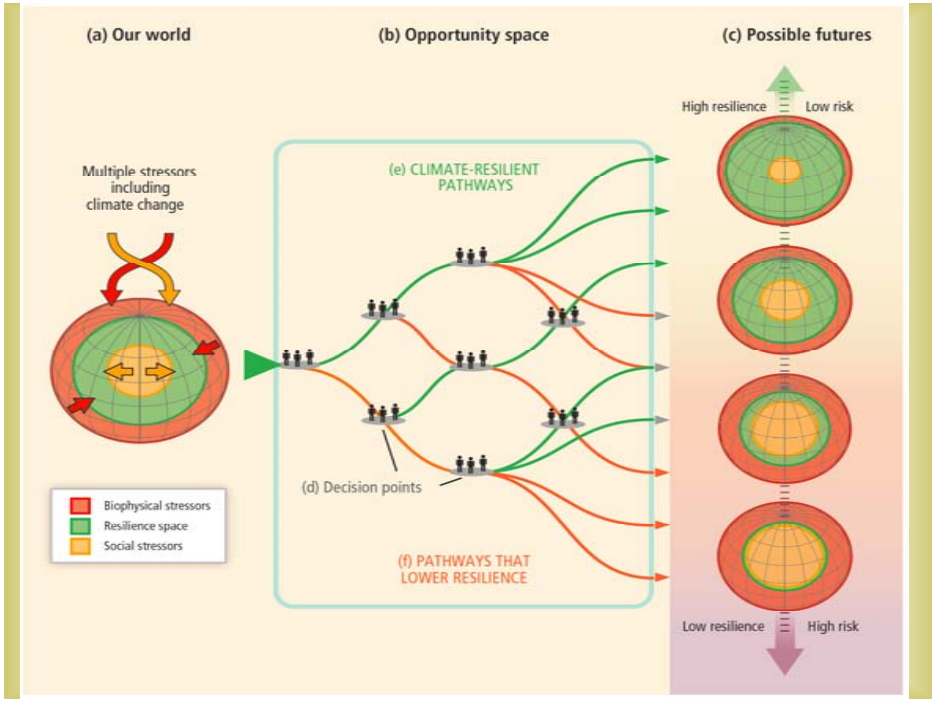
Beyond planetary boundaries

Loulergue, L. et al Orbital and millennial-scale features of atmospheric CH4 over the past 800,000 years, Nature, 2008.
Lüthi, D. et al High-resolution carbon dioxide concentration record 650,000-800,000 years before present Nature, 2008.

Human Development and Earth System Dynamics



Source: GRIP ice core data (Greenland) and S. Oppenheimer, "Out of Eden", 2004



P1. Maintain diversity & redundancy

- "Systems with many different components are generally more resilient than systems with few components.
- Redundancy provides 'insurance' within a system by allowing some components to compensate for the loss or failure of others.
- Redundancy is even more valuable if the components providing the redundancy also react differently to change and disturbance."

- Hypothesis: Livestock diversity
- Tolerance to diversity of cultures in the XIII century
- **Open country since democracy**
  - Freedom for diversity
  - Emergence of the Mongolian culture and freedom
- **Diversity of economy!**
  - Diversity of export!
- "Bagsh – shav" relation is valuable for redundancy

Principles for Building Resilience: Sustaining Ecosystem Services in Social-Ecological Systems, 2014

P2. Manage connectivity

- "**Connectivity can both enhance and reduce the resilience** of social-ecological systems and the ecosystem services they produce.
- *Well-connected systems can overcome and recover from disturbances more quickly, but overly connected systems may lead to the rapid spread of disturbances across the entire system so that all components of the system are impacted."*

- Unification for development of Mongolia
- Uncouple private business and government, fighting against oligarchy
- Hypothesis: Traditional networks become stronger after disasters like zud, but tend to become loose during normal years?

Principles for Building Resilience: Sustaining Ecosystem Services in Social-Ecological Systems, 2014

P3. Manage slow variables & feedbacks

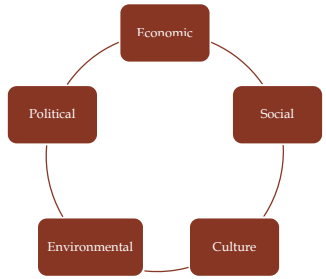
- "In a rapidly changing world, managing slow variables and feedbacks is often crucial to keep social-ecological systems configured and functioning in ways that produce essential ecosystem services.
- If these systems shift into a different configuration or regime, it can be extremely difficult to reverse."

- Climate change as critical slow variable
- Reduce brain drain, instead encourage brain gain and brain circulation as (+) feedbacks
- Prevent from collapse, avoiding inequality (poverty trap) and environmental degradation

Principles for Building Resilience: Sustaining Ecosystem Services in Social-Ecological Systems, 2014

P4. Foster complex adaptive systems thinking

- "Although Complex Adaptive Systems thinking does not directly enhance the resilience of a system,
- acknowledging that social-ecological systems are based on a complex and unpredictable web of connections and interdependencies is the first step towards management actions that can foster resilience."

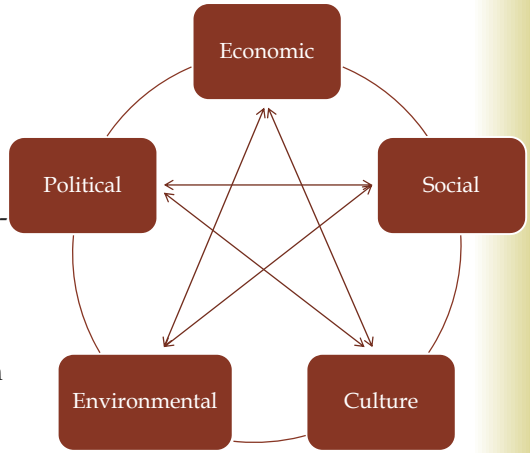


Mongolia is viewed as an **open complex adaptive system**

Principles for Building Resilience: Sustaining Ecosystem Services in Social-Ecological Systems, 2014

Mongolia as an open complex system

Mongolia is viewed as an **complex adaptive system**, consisted of interconnected political, economic, social, ecological and cultural subsystems as five main organs of the organism, interconnected through father-son and friend-enemy connections (as in folk medicine). For Mongolia's health it is essential to have healthy subsystems. Mongolia made transition to democracy and market economy 2 decades ago, becoming **an open system** – necessary condition for change!



P5. Encourage learning

- "Learning and experimentation through adaptive and collaborative management is an important mechanism for building resilience in social-ecological systems.
- It ensures that different types and sources of knowledge are valued and considered when developing solutions, and leads to greater willingness to experiment and take risks."

- **Local and traditional knowledge**
- **Innovation, science and technology** as a tool for transformation, building societal resilience
- Economic and ecological interdependence zenith?

Principles for Building Resilience: Sustaining Ecosystem Services in Social-Ecological Systems, 2014

P6. Broaden participation

- "Broad and well-functioning participation can build trust, create a shared understanding and uncover perspectives that may not be acquired through more traditional scientific processes."
- Japan (130?) - Mongolia (3) partnership
- Participation for local development, including nutgiin zovlols?
- Co-design of research, co-implementation by multiple stakeholders

Principles for Building Resilience: Sustaining Ecosystem Services in Social-Ecological Systems, 2014

P7. Promote polycentric governance systems

- "Collaboration across institutions and scales improves connectivity and learning across scales and cultures.
- Well-connected governance structures can swiftly deal with change and disturbance because they are addressed by the right people at the right time."
- **Application of resilience concept for governance** and management of social-ecological systems
- Promote traditional pastoral networks such as *neg golynhon*
- Training of local leaders on sustainability for public administration

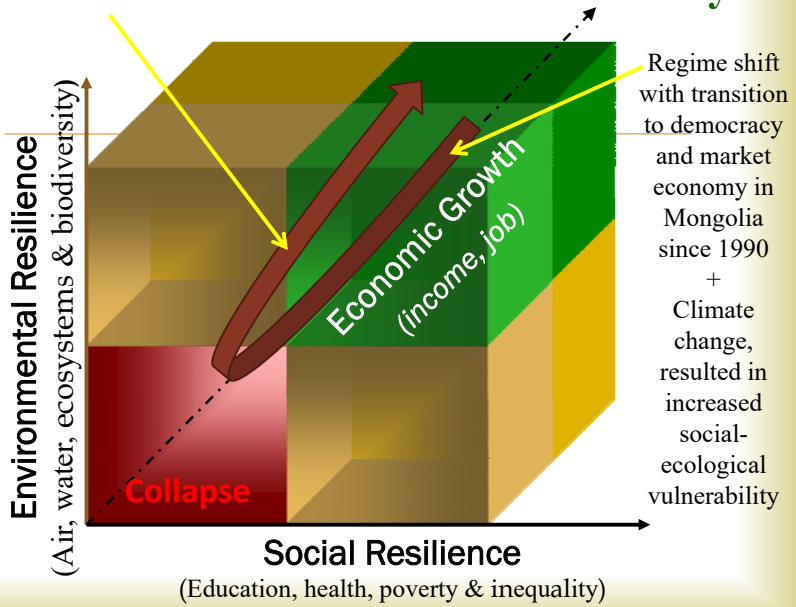
Principles for Building Resilience: Sustaining Ecosystem Services in Social-Ecological Systems, 2014

Green Civilization in the Anthropocene

Green civilization:
"Development that meets the needs of the present while safeguarding diversity of cultures and Earth's life-support system, on which the welfare of current and future generations depends."

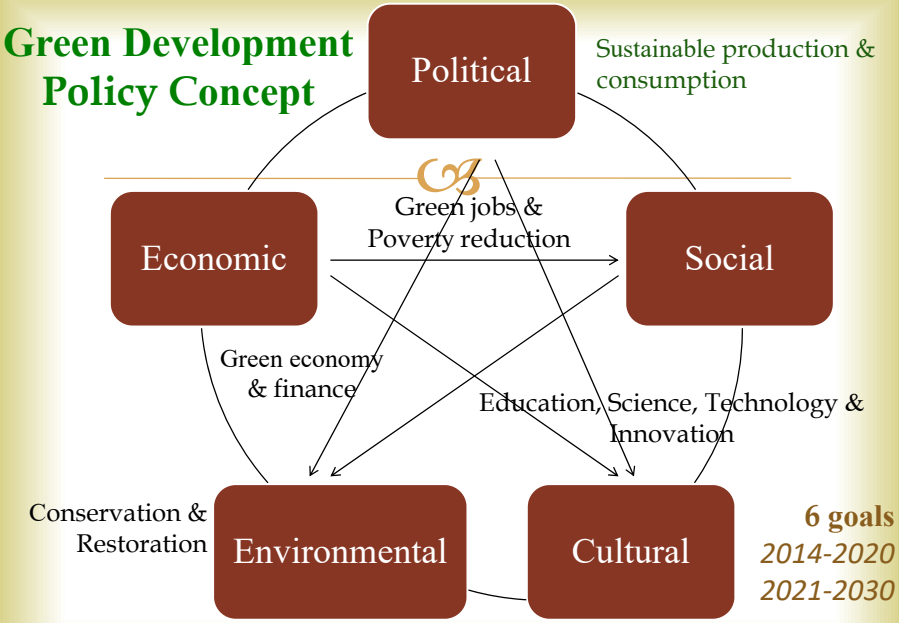
Sustainable development goals for people and planet, Nature *495, 305–307 (2013)*

Transformation towards Sustainability



T. Chuluun, Minstry of Environment and Green Development of Mongolia

Green Development Policy Concept



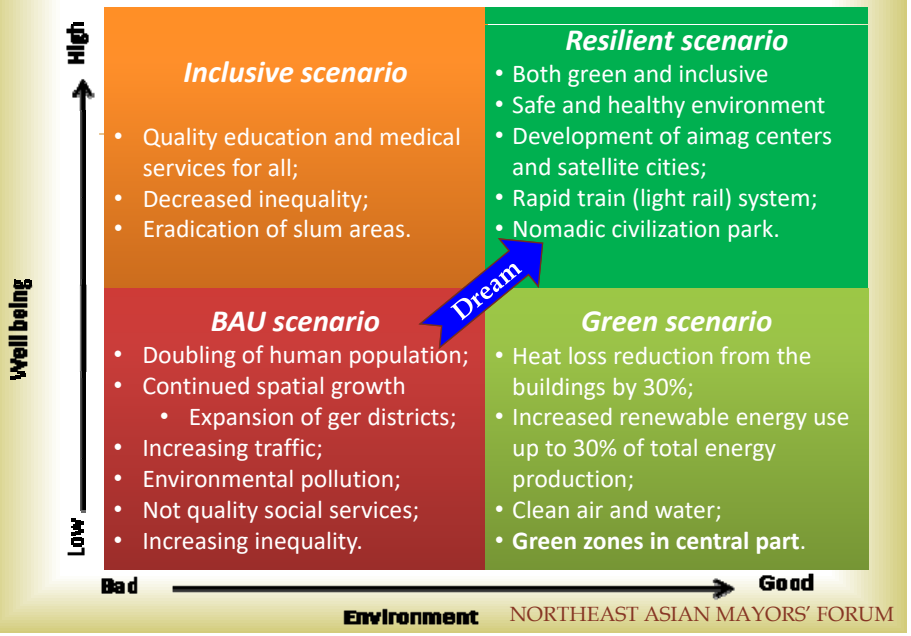
T. Chuluun, Minstry of Environment and Green Development of Mongolia

Goal 6. Development compatible with climate change, natural resources & **resilience of regions**

***Strategic objective #6**: Develop and implement a population settlement plan in accordance with climate change, while considering the availability of natural resources and **the resilience of regions**.*

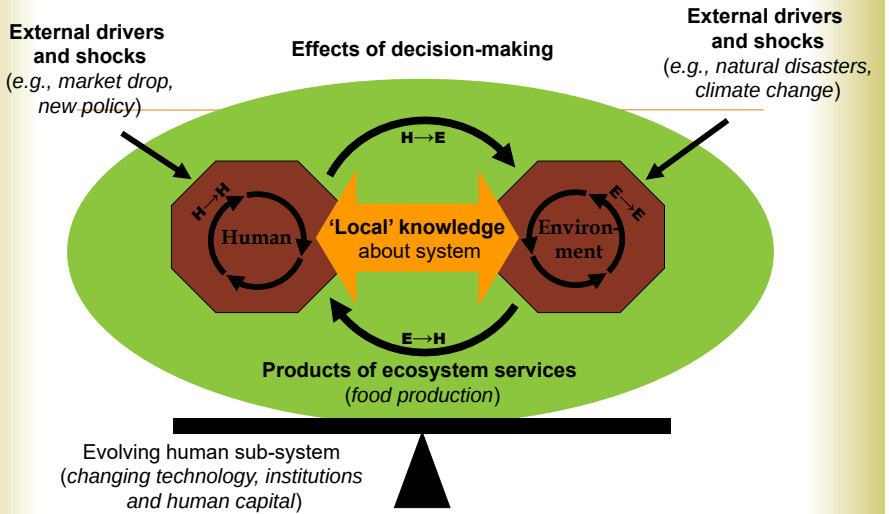
- Building green smart cities & villages for quality of life
- Green urban planning

Future Scenarios of Ulaanbaatar City by 2030

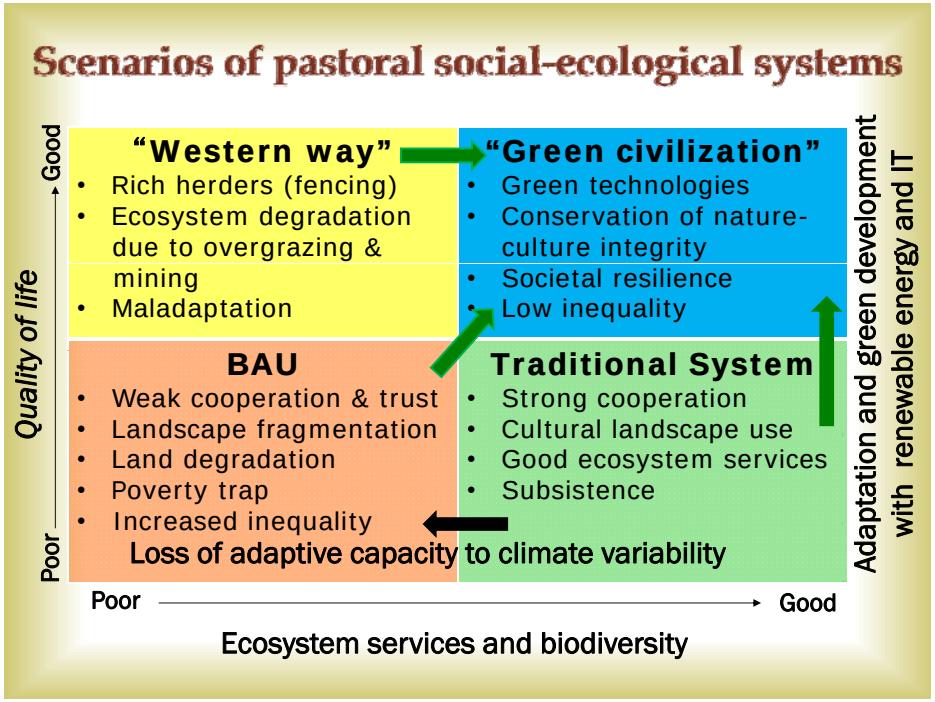


NORTHEAST ASIAN MAYORS' FORUM

Human-Environmental System



Stafford Smith, McKeon et al (2007) *PNAS*



Green development model of pastoral system

- Chuo University, Tokyo, Japan

http://www.ccau.jp/

Mongolia: Resilience History

- Did we have resilience in Mongolia in the past?
  - Persistence - Yes
  - Adaptability - Yes
  - Transformability – Yes and No
- What was the sources of Mongolian people's resilience?
  - Culture compatible with extreme continental climate?
  - Intellectual capacity due to food?
- Are we strengthening resilience in Mongolia now?
  - Brain drain (тархины дүрвэлт)!
    - Brain gain and brain circulation!

Opportunities for Mongolia

- Economic resilience:
  - Creating **future funds** to cope with uncertainties
  - Diversifying economy
- Political resilience:
  - **Building inclusive political institutions** to foster inclusive economic institutions (***James Robinson***)
- Social resilience:
  - Reducing inequality & providing equal opportunities
- **Natural and Cultural Resilience Enforcing**
- *Governance for Resilience and Sustainability across scales*

Summary

- Mongolia has rich resilient **history**
- Cultural, natural and historic heritages must be foundation for **future** prosperity of Mongolia
- **Global lessons, technologies and innovations** are amplifying factors for transformation of Mongolia towards sustainability
  - *Strategic partnership between Japan and Mongolia, including low carbon development partnership and free trade may serve as critical drivers*

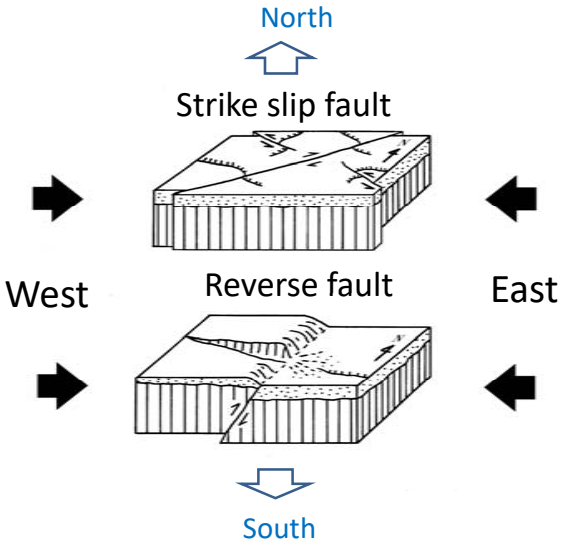
Problems of the 2016 Kumamoto Earthquakes in Japan

continuously occurring since 14 April

Yasuhiro Suzuki
Nagoya University

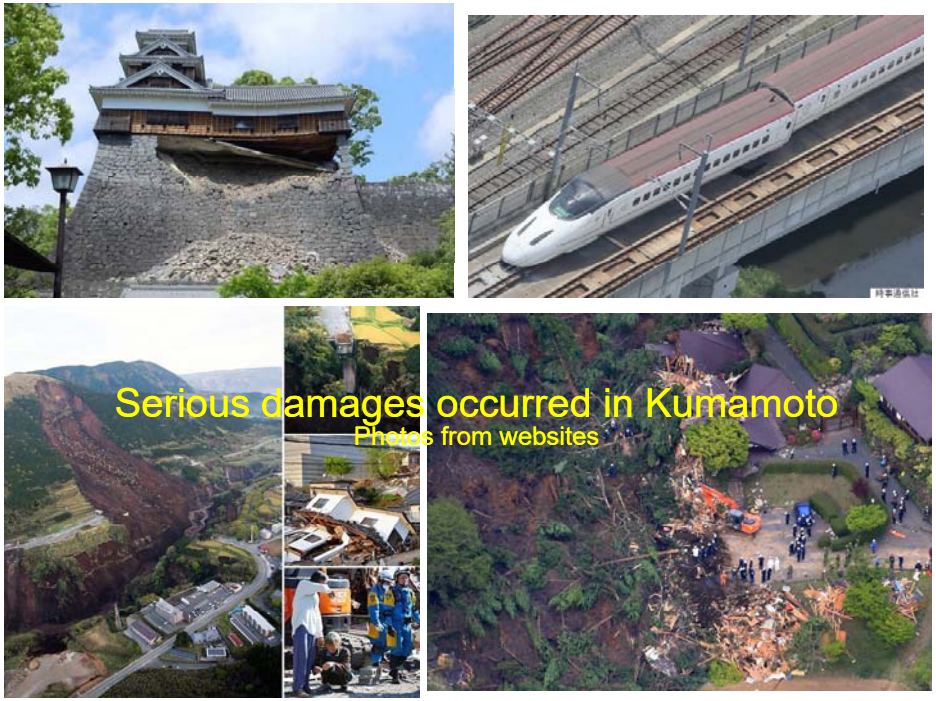
Active Fault - the origin of the earthquake

Active Faulting



Ruptures running toward the village

Surface ruptures on paddy field



Situation of damage

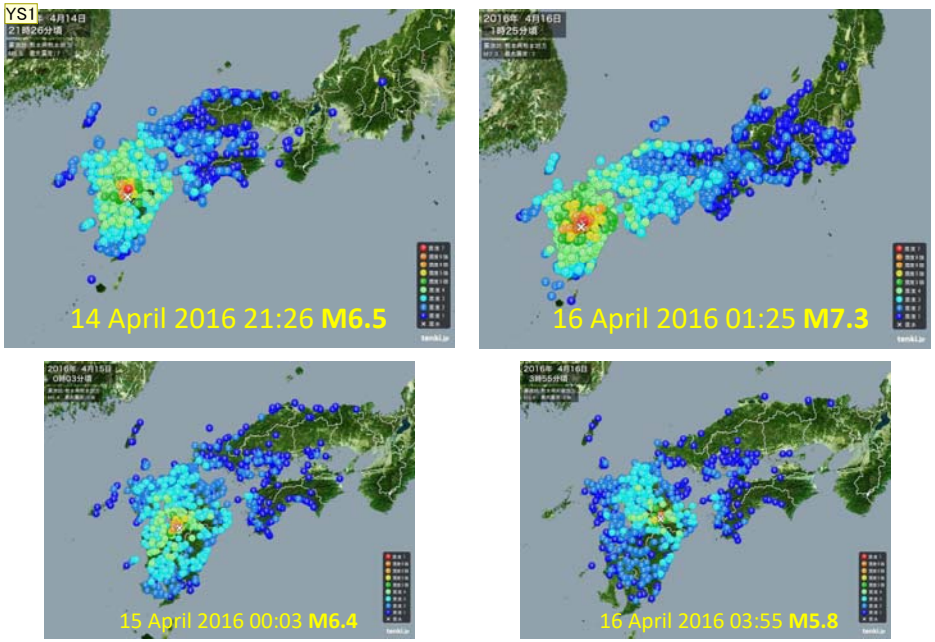
as of 13 May 2016

- Death: 68
- Missing: 1
- Damaged houses: 37,921
- Evacuee: 10,477

Serious problems with repeating earthquakes

M6.5 (14 Apr.), M7.3 (16 Apr.)

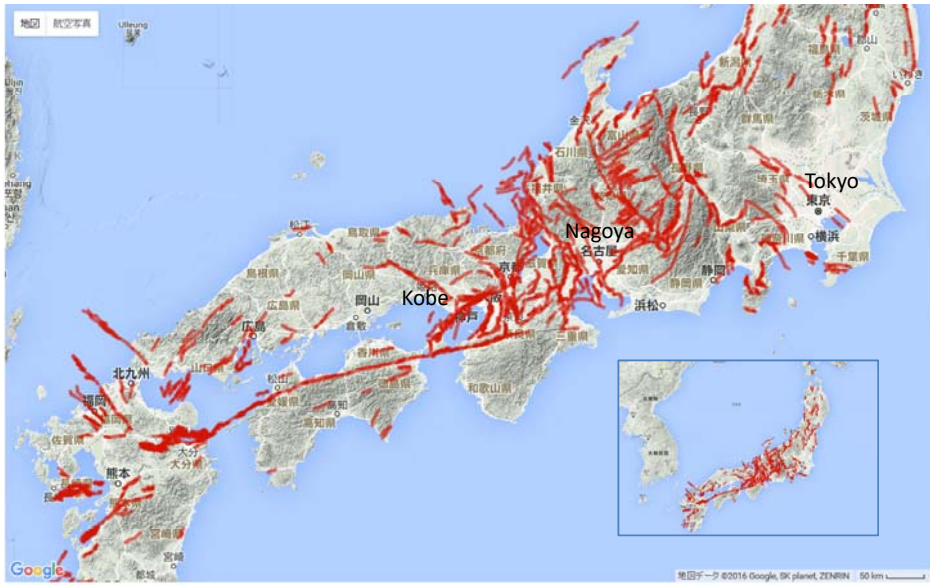
Surprisingly, the latter one was larger !



1,500 earthquakes during 1 month

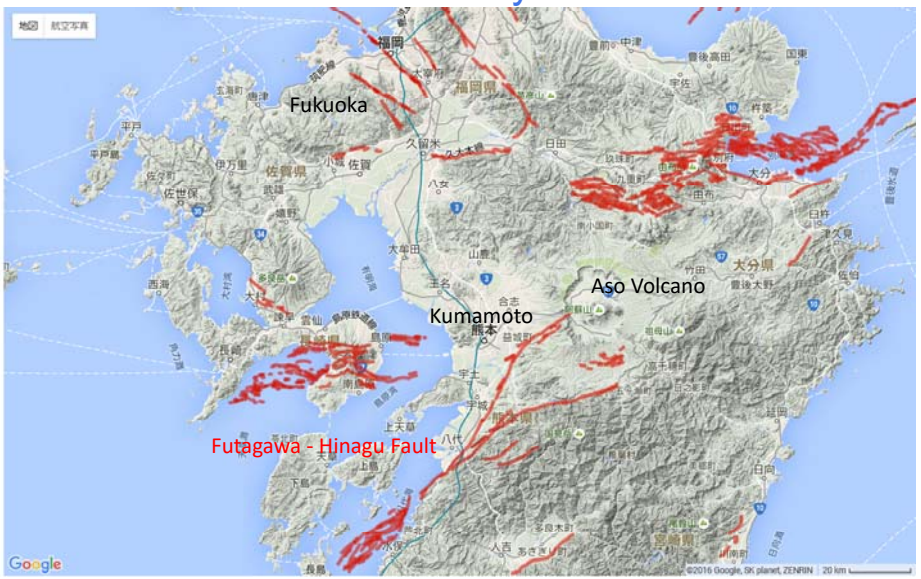
YS1 Yasuhiro SUZUKI, 2016/05/13

Active Faults in Japan



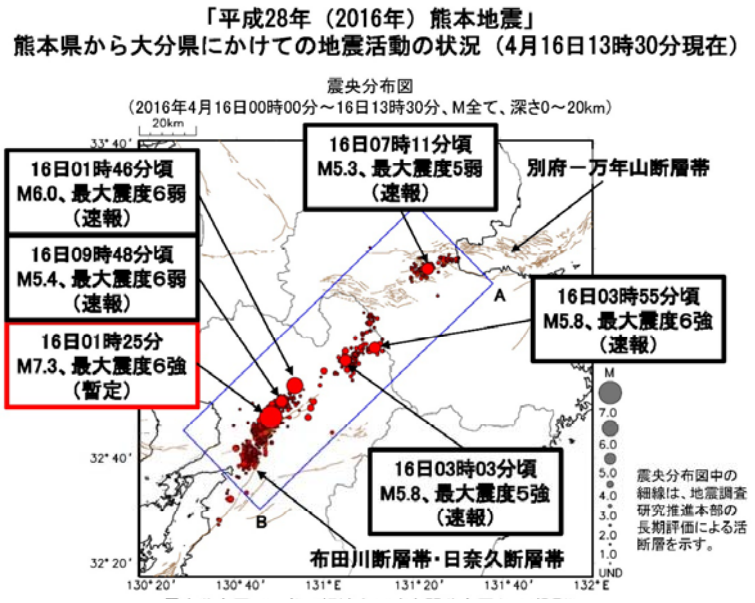
https://gbank.gsj.jp/activefault/

Active Faults on Kyushu Island

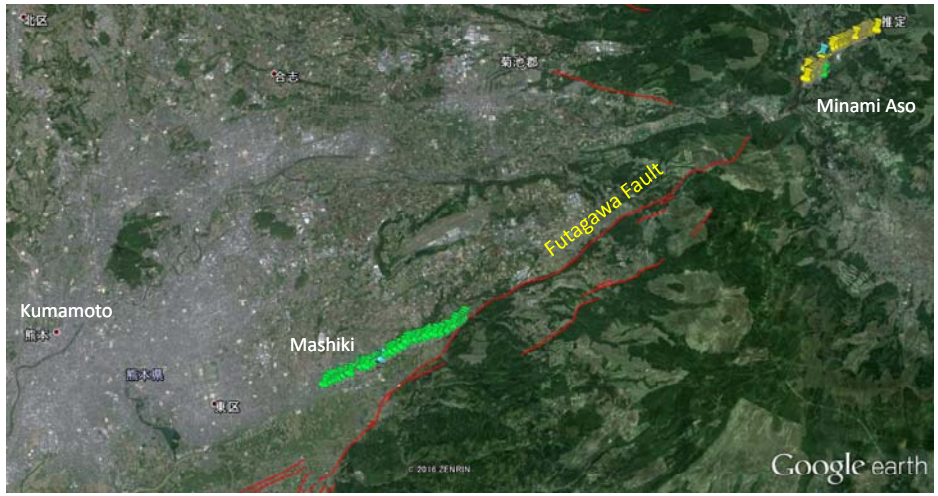


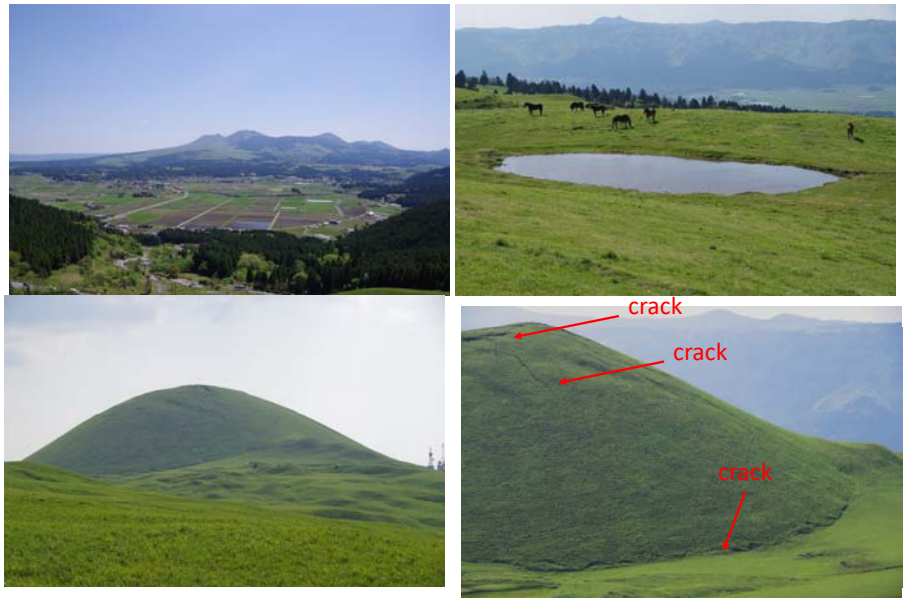
https://gbank.gsj.jp/activefault/

Earthquakes in Succession



Active faults around the city of Kumamoto city





View of the Aso Volcanic Area

Landslide destroyed the bridge

Ruptures running toward the village

Right lateral offset of 1.2 m

Rupture of earthquake fault running toward the residential area

Houses just on the earthquake faults

Double deck houses just on the earthquake faults

Earthquake faults in Minami Aso area

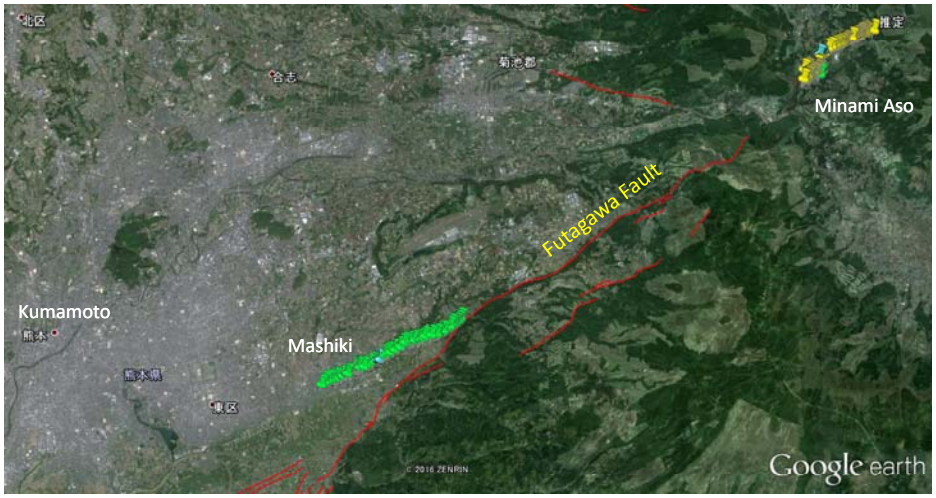
Earthquake faults in Minami Aso area

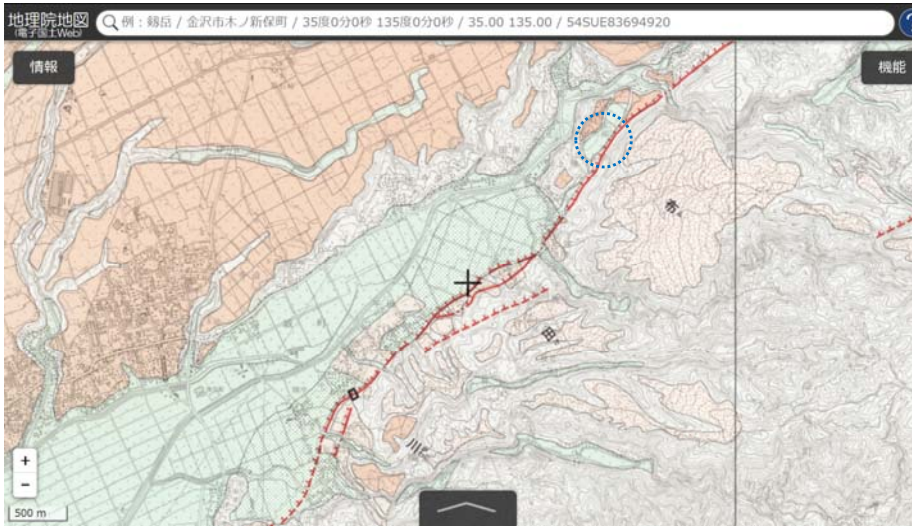
Collapsed Houses in the vicinity of the earthquake fault

Cars turned over on their sides close to the active fault

Offset of an underground path

Active faults around the city of Kumamoto city





Active Fault Map on the Website

Branching fault in the Mashiki town

Branching fault in the Mashiki town

Branching fault in the Mashiki town

Current status of Earthquake Disaster Risk Reduction in Mongolia

SERJMYADAG. D, PhD
Scientific secretary, Disaster Research Institute, NEMA
Lieutenant colonel

International Workshop on Resilience Research
16 May 2016

Contents

Seismicity in Mongolia

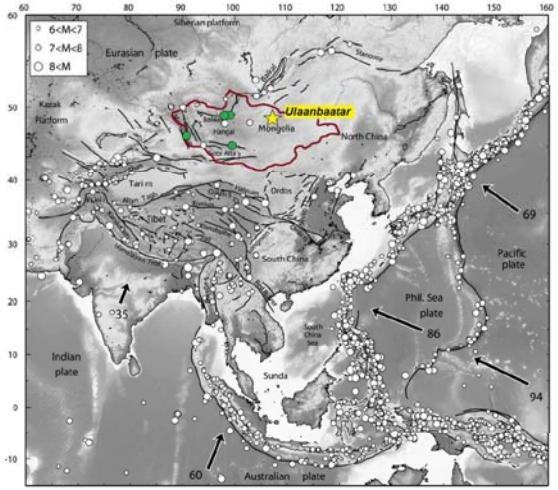
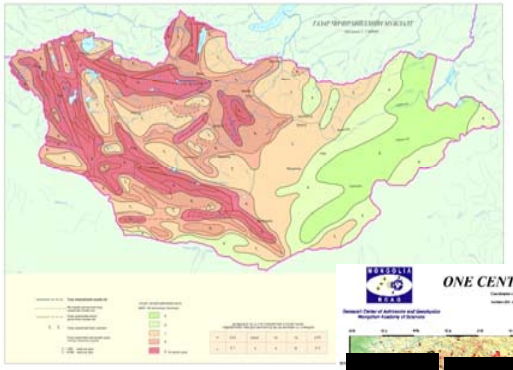
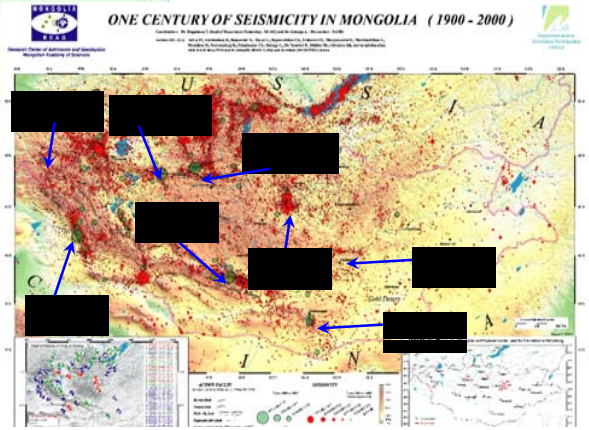


Figure 1. Tectonic setting of Mongolia, and Ulaanbaatar, within the wider India-Eurasia collision *zone (from Vergnolle, et al., 2007).*
Green circles show locations for the 1905, 1931, and 1957 earthquakes.

Source: Research Institute of Astronomy and Geophysics

Seismicity in Mongolia



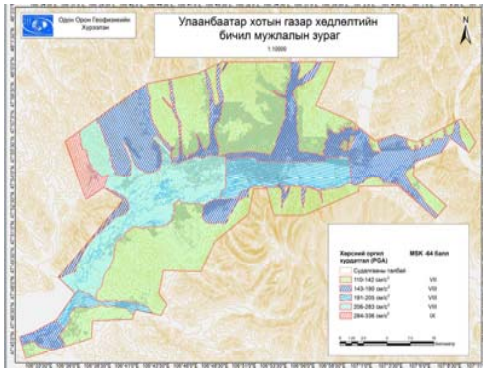


Last century, several strong continental seismic events took place in Mongolia.

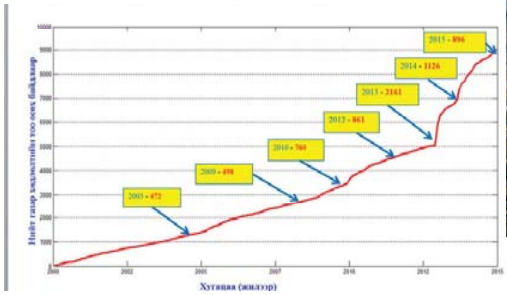
Source: Research Institute of Astronomy and Geophysics

Seismicity in Ulaanbaatar city

UB City is undergoing rapid and uncontrolled urbanization, with the population having approximately doubled in the last 10 years to 1.3 million.



Seismicity in UB city (2005-2005)



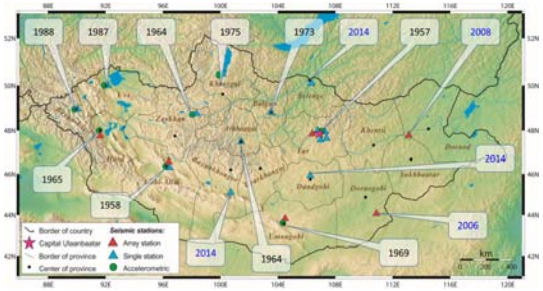
Source: Research Institute of Astronomy and Geophysics

Earthquake Disaster Risk Reduction Research in Mongolia

- **1957, International Geophysical Year**

A great earthquake of Gobi-Altay took place at 1957-12-04, 03:37 UTC with magnitude 8,1.

From left side:
A.P. Vinogradov ,
E. Baljinnyam , D. Munkhuu,
N.V. Shebalin



Seismic observation network of Mongolia

Source: Research Institute of Astronomy and Geophysics

Status of Earthquake DRR Research in Mongolia, 2011-2015

Disaster management phase

Pre Disaster
- Prevention & Risk Reduction
  - Risk assessment
  - Structural mitigation
    - Resistant construction
    - Building codes and Regulatory measures
    - Structural modification
    - Detection system
  - Non structural mitigation
    - Regulatory measure
    - Community awareness
    - Behavior change
- Preparedness
  - DM planning
  - Exercise
  - Training
  - Equipment
  - Legislation
  - Public education

During Disaster
- Warning
- Search & Rescue
- Evacuation
- Relief

Post Disaster
- Reconstruction
- Rehabilitation

This study

15 measures

8 organizations

Research organization classification on EDRR

Institute under National Academy of Science
- Research Institute of Astronomy and Geophysics
- Research Institute of Geology and Geo ecology

Research Institutions under Government Agency
- Disaster Research Institute, NEMA
- Construction Development Center
- Health Department of the Capital City

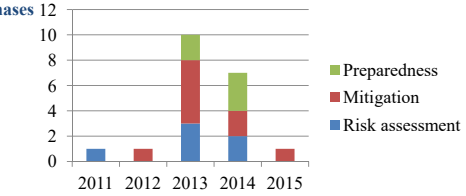
University
- School of Construction and Architecture Mongolian University of Science and Technology
- Department of Geography, National University Mongolia,
- School of Emergency management, Law Enforcement University

NGO an International organizations
- Red Cross
- World Bank
- ADB
- World Vision
- JICA
- National center of Disaster Response

Trend of Earthquake Disaster Risk Reduction Research in Mongolia, 2011-2015

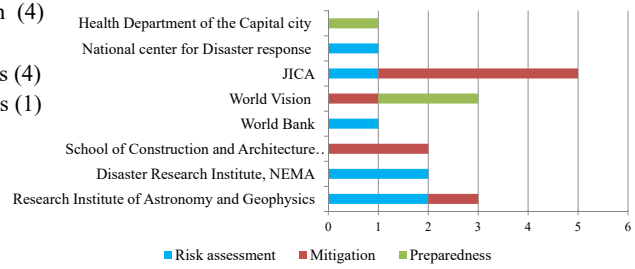
Earthquake DRR research by Disaster Management phases

Many research: **risk assessment, structural mitigation**
Less research: **community preparedness**



- **Prevention & Risk Reduction: 17 research**
  - Risk assessment (6)
  - Structural mitigation (7)
  - Non structural mitigation (4)
- **Preparedness: 5 research**
  - Government preparedness (4)
  - Community preparedness (1)

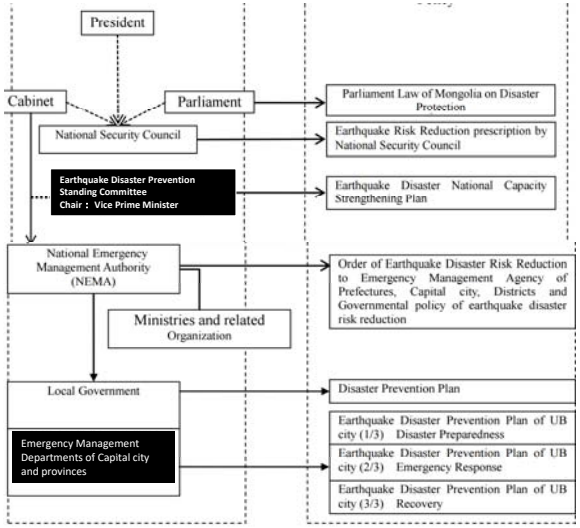
Earthquake DRR research by DRR measures



Earthquake DRR research by Research Organization

Status of Earthquake Disaster Risk Reduction in Mongolia

Institutional and regulatory environment on Earthquake DRR



- **The Sendai framework for disaster risk reduction** 2015–2030 (SFDRR)
- **The state policy on disaster protection, R**esolution # 22, of The State Ikh Khural, Mongolia, 2011
- **The national programme on strengthening disaster protection capacity, R**esolution # 22, of the State Ikh Khural, Mongolia, 2011
- **The national programme of community participatory disaster risk reduction**, The Resolution #303 of The Government of Mongolia, 2015

- **Earthquake Disaster National Capacity Strengthening Plan** 2011–2015, **R**esolution # 95, of The Government of Mongolia, 2011
- **Earthquake Disaster Prevention and Risk Reduction Plan,** 2016–2020 **R**esolution # ..., of The Government of Mongolia, 2016

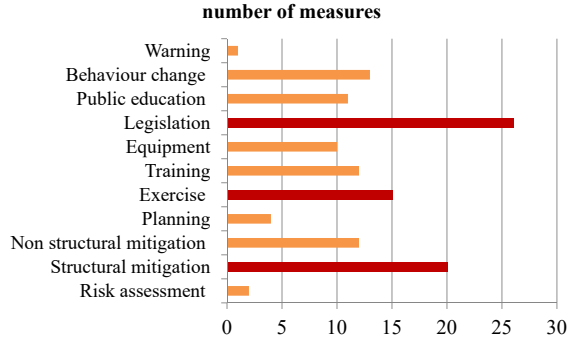
Status of Earthquake Disaster Risk Reduction in Mongolia

Analysis on Earthquake Disaster National Capacity Strengthening Plan, 2011–2015

Status of Earthquake DRR measures in 2011-2015

- **Prevention & Risk Reduction: 34 measures**
  - Risk assessment (2)
  - Structural mitigation (20)
  - Non structural mitigation (12)
- **Preparedness: 92 measures**
  - Government preparedness (67)
  - Community preparedness (25)

Many measure: **structural mitigation, exercise, legislation**
Less measure: **risk assessment, planning, public education, warning**



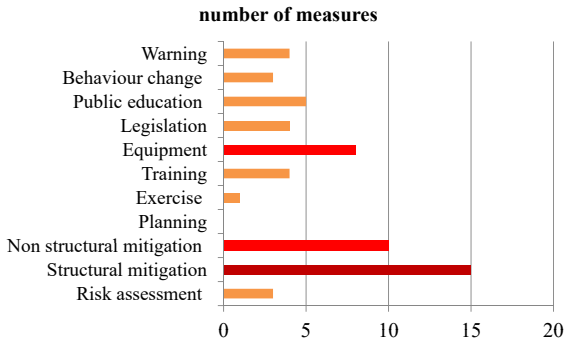
Status of Earthquake Disaster Risk Reduction in Mongolia

Analysis on Earthquake Disaster Prevention and Risk Reduction Plan, 2016–2020

Trends of Earthquake DRR measures in 2016-2020

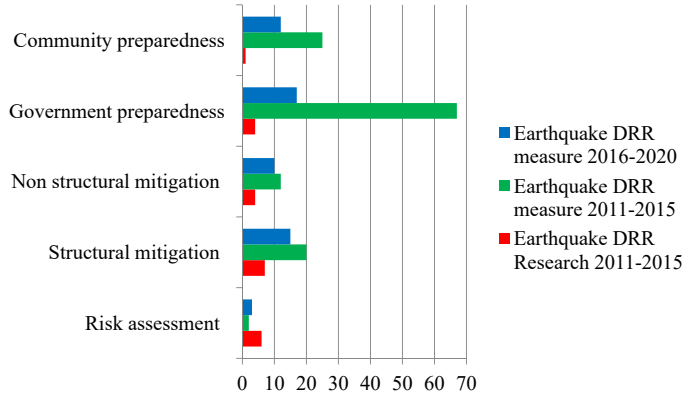
- **Prevention & Risk Reduction: 28 measures**
  - Risk assessment (3)
  - Structural mitigation (15)
  - Non structural mitigation (10)
- **Preparedness: 29 measures**
  - Government preparedness (17)
  - Community preparedness (12)

Many measure: **structural mitigation, non structural mitigation, equipment**
Less measure: **risk assessment, training, exercise**



Current status of Earthquake DRR in Mongolia

- Most Earthquake DRR activity focused on government preparedness



Conclusion

- **High seismic active faults have a both in surrounding UB city and in the western part of Mongolia.**
- **Earthquake observation study has been developing from 1957 in Mongolia.**
- **Earthquake disaster risk reduction research is now just started in Mongolia.**
- **Many earthquake DRR research focused on risk assessment, structural mitigation**
- **Less earthquake DRR research focused on community preparedness**

Thank you.

Conclusion

In 2011-2015:

- **Many Earthquake DRR measures related to structural mitigation, exercise and legislation**
- **Less Earthquake DRR measures related to risk assessment, planning, public education and warning**

In 2016-2020:

- **Many Earthquake DRR measures will be focus on structural mitigation, non structural mitigation and equipment**
- **Less Earthquake DRR measures will be focus on risk assessment, training and exercise**

- **Most Earthquake DRR activity were focused on government preparedness**
- **Most important thing is to improve community preparedness in Mongolia.**

Assessing water quality of Sugnugur, Gatsuurt and Kharaa rivers using macroinvertebrate communities

Irmuunzaya Kh.
Master of Environmental Science

Ulaanbaatar, 2016

Background of study

- Studies in the Kharaa and adjoining river basins show that gold mining is a major polluter (Chalov et al., 2012; Thorslund et al., 2012) and that it drastically affects the ecology of diatom, macrozoobenthos and fish communities (Kratz et al., 2010; Saulyegul, 2011).
- WWTP cleans wastewater up to 90%, mostly however, lower than 90%. The capacity of WWTP is actually to clean 50 000 m^3 of wastewater, but nowadays only 15 000-17 000 m^3 are provided (Batimaa P., Erdenebayar Ya. 2013).

What are macroinvertebrates?

- Organisms that lack a backbone and can be seen with the naked eye such as aquatic insects, mollusks and crustaceans
- The organisms that we will be sampling for are benthic macroinvertebrates – macros that live in the substrate, or bottom, of a water body
- Macros live in various stream habitats and derive their oxygen from the water
- These organisms are impacted by all the stresses that occur in a stream environment, both man-made and naturally occurring

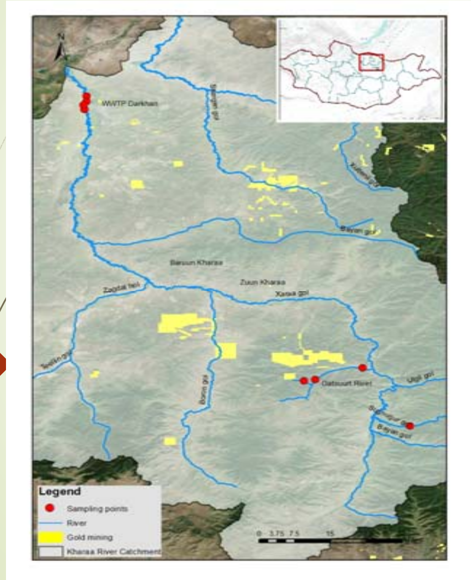
Study purpose

- To identify the impact of mining activities and wastewater treatment plants on river water quality using macroinvertebrate community structure

Objectives

- To measure and analyze some important physicochemical parameters
- To identify the macroinvertebrate community structure
- To study the correlation between physicochemical parameters and macroinvertebrate communities

Sampling sites



- Сөгнөгөр- Батсүмбэр, Төв аймаг
- Гацуурт- Түнхэл тосгон, Сэлэнгэ аймаг
- Хараа гол- Дархан хот, Дархан-Уул аймаг

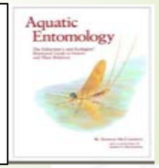
Study methods

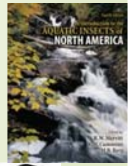
Field study

1. Measuring of some physicochemical parameters of water
2. Sampling of macroinvertebrates

Laboratory study

1. Measuring of nutrients amount of water
2. Determination of macroinvertebrates



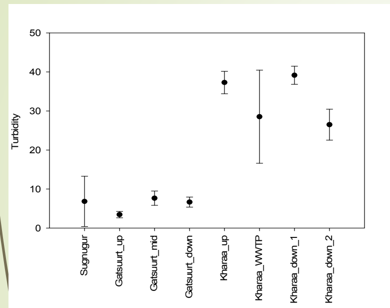


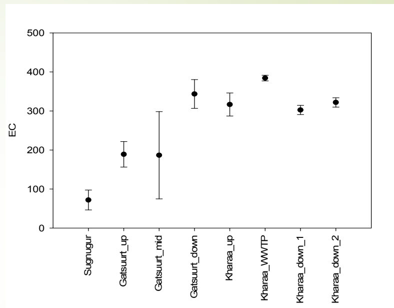
Data processing

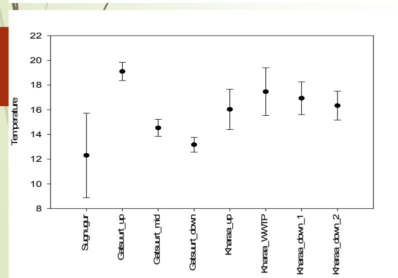
Analysis:

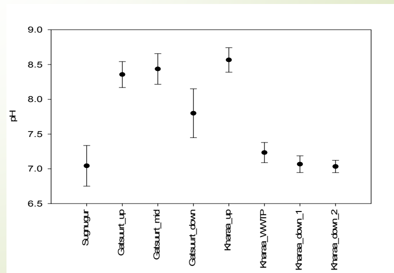
- All variables were tested for normal distribution
- Oneway-ANOVA differences of macroinvertebrate structure and environmental parameters between sites
- Shannon-Wiener Index: H = $-\sum_{i=1}^{S} p_i ln p_i$
- Evenness Index: E = $\frac{H}{LogS}$
- Cluster analysis are a way to assess and identify many variables by their similarity
- Correlations based on the Spearman's correlation coefficient (r_s)
- A canonical correspondence analysis (CCA)

Physicochemicals parameters

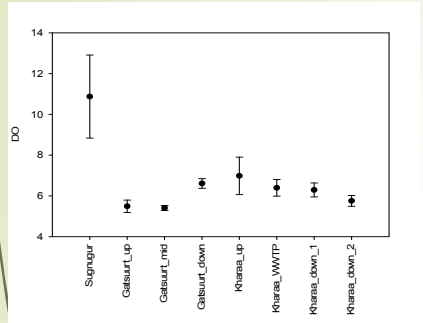


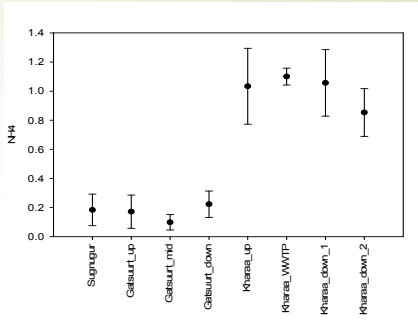


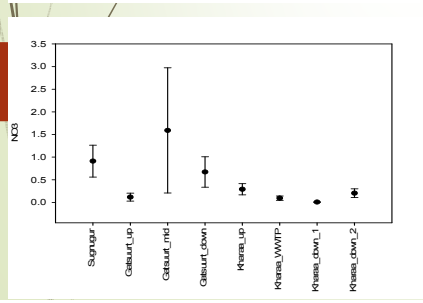


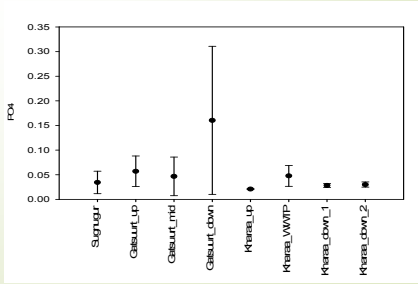


Physicochemicals parameters

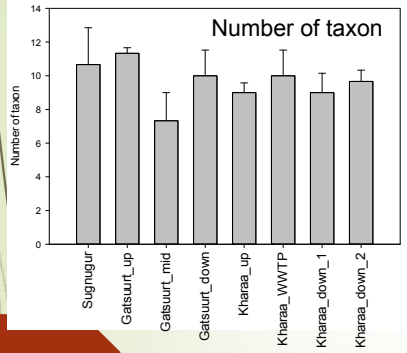




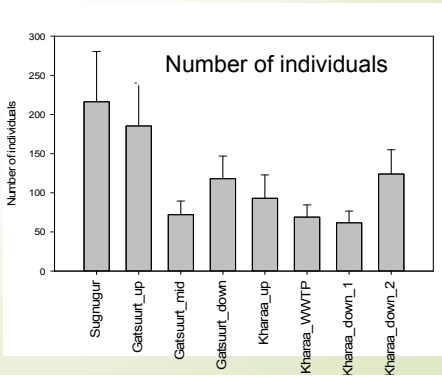




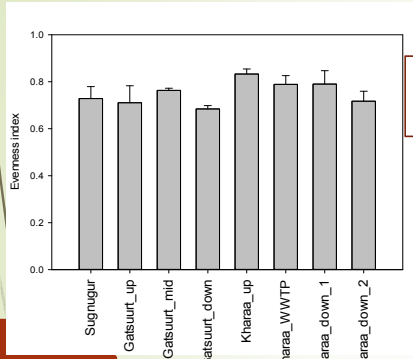
Macroinvertebrate community structure



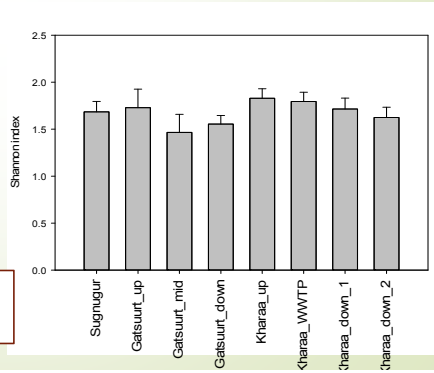
- 8 orders
  27 families
  40 genera
- 3 other classes = 3295 individuals



Macroinvertebrate community structure

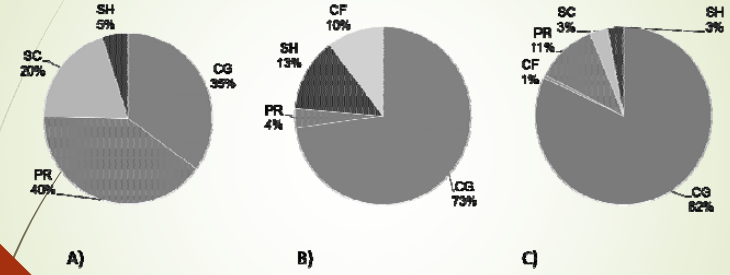


Evenness index



Shannon Index

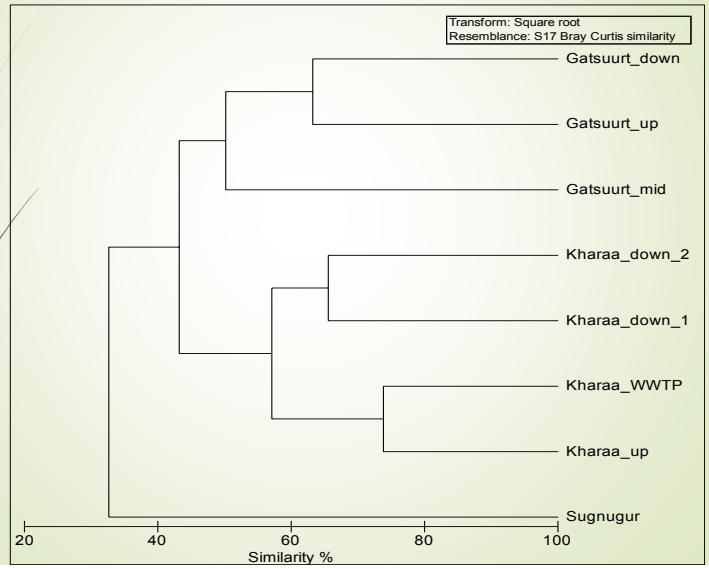
Functional feeding group



Compositions of functional feeding groups at the eight sampling sites. A-Sugnugur, B-Gatsuurt, C-Kharaa

SC=Scraper, SH=Shredder, PR=Predator, CF=Collecter-filterer, CG=Collector-gatherer

Similarity of macroinvertebrate community

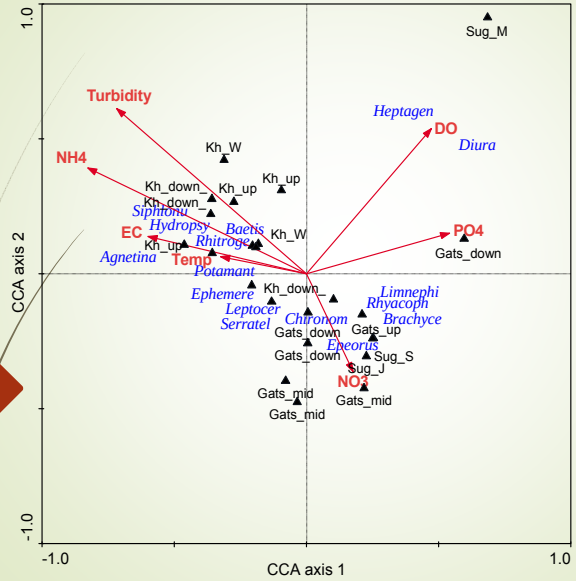


Relationships between environmental parameters & communities

Spearman's Rank Correlation:

- Turbidity (NTU) & Individual number (p=0.04, rs=(-0.405))
- EC (S/m) & Individual number (p=0.01, rs=(-0.489))
- NH_4^+(mg/L) & Individual number (p=0.01, rs=(-0.507))
- DO (mg/L) & Shannon Index (p=0.03, rs=0.430)

Canonical correspondence analysis:



PLE-Agnetina
EPH-Baetis
TRI-Brachycentrus
DIP-Chironomini,
PLE-Diura
EPH-Epeorus
EPH-Ephemerella,
EPH-Heptagenia
TRI-Hydropsyche,
TRI-Leptocerus,
TRI-Limnephilus,
EPH-Potamanthus,
EPH-Rhitrogenia,
EPH-Rhyacophila,
EPH-Serratella,
EPH-Siphlonurus

Discussion& Conclusions

- EC, turbidity, water t^0 and the concentrations of NH_4^+ , PO_4^{3-} of Sugnugur river were low, while DO was high, and the pH showed alkalinity (6.7-7.4). Regarding biodiversity of macroinvertebrates numbers of genera, individuals, index of diversity and evenness were higher than at other points of study. As demonstrated by cluster analysis it was very different from other studied rivers.

Discussion& Conclusions

- EC of Gatsuurt River was lower than at sampling points of Kharaa, Turbidity and water t^0 were low here, pH showed more alkalinity and some nutrients had no big difference, but macroinvertebrate community structure is different from the reference river. Shannon index and the numbers of macroinvertebrate genera in Gatsuurt _mid sampling were the lowest of all sample points, while individual number was quite low. All these indicators show that Gatsuurt is highly impacted by human (mining activities) at midstream.

Discussion& Conclusions

- EC, turbidity and water t^0 were higher at Kharaa than in Sugnugur River, while DO of Kharaa was lower than Sugnugur, almost similar to Gatsuurt River and nutrients were higher than in other rivers. However, number of individuals is less, there was no big difference of genera number and index of diversity as well as evenness. It shows there could be an impact of WWTP Darkhan compared to Kharaa_up point, upstream of WWTP. It can be said from all the indicators that self-purification process distance of Kharaa is short, there is a fact, this process takes about 10 km at Kharaa.

Thanks to:

- My dear teachers Dr. M.Pfeiffer & Dr. D.Narangarvuu for all valuable advices and encouragement
- Friends B.Gunsmaa & B.Bolortuya for help during field work
- Students of School of Sciences and Arts O.Narantsatsral & S.Namjilmaa for help during identification of the macroinvertebrates
- Mrs. B.Buyankhand for encouragement during my study
- My family for eternal support, love and inspiration

Thank you for your attention!

Adaptation or Resilience for Dzud Mitigation in Mongolia?

Ch.Ariunaa
NEMA Mongolia
16 May 2016

Content

- Background – dzud, adaptation, and resilience
- Previous studies
- Methodology
- Results
- Limitations
- References

Dzud

Mongolian term for an extremely snowy winter in which large numbers of livestock die due to starvation by being unable to graze, and the cold.

+ Drought + El Nino

+ Knowledge

+ Global warming¥climate change

+ Capacity + Institutions

Why?

Year	Type of disaster
1944-45	Dzud +Drought
1954-55	Dzud
1956-57	Dzud
1967-68	Dzud +Drought
1976-77	Dzud
1986-87	Dzud
1993-94	Dzud
1996-97	Dzud
1999-00	Dzud +Drought
2000-01	Dzud +Drought
2001-02	Dzud +Drought
2009-10	Dzud +Drought
2015-16	Dzud

DZUD	# of perished livestock	Amount of economic damage ($, million)	Leading agency for mitigation
1999-2000	3.5 million	65	The State Emergency Commission/ NEMA
2000-2001	4.8 million	87	
2009-2010	9.7 million	292.5	

Why?

	Level		
	Household	Community	Cross-Level
Physical	• Inadequate livestock shelter	• Snow depth • Coldness • Drought • Limited water availability	• Climate change affecting water availability, drought frequency and possibly dzud frequency
Biological	• Poor animal condition	• Poor summer/fall forage • Limited habitat diversity (lack of sufficient haying areas, natural refuges, de facto grazing reserves) • "Hoofed dzud"	
Socio-economic	• Lack of knowledge/experience • Poverty level • Lack of alternative or supplemental income opportunities	• Poverty rate • Limited alternative employment opportunities	• Increasing aid dependence may reinforce poverty and stifle initiative
Institutional	• Weak bonding social capital (ties to relatives & close friends) • Weak bridging and linking social capital (ties to local or regional government, NGOs, donor projects)	• Little mutual assistance and informal cooperation • No formal collective action or community-based organizations • Weak and/or reactive local government • Weak coordination between local government, NGOs, donor projects, and herder communities	• Weak or non-existent cross-level and cross-boundary pasture management institutions • Weak disaster management and coordination

Adaptation

- Adaptation is the set of actions, attitudes, activities, and decisions that enable individuals, groups, or systems to persist in the face of current or future change or shocks.
  - Fernandez-Gimenez et al., 2015
- The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.
  - UNISDR Terminology on DRR, 2009
- Adaptation to climate change is the process of natural and human systems adapting to changing environmental and climatic conditions. It includes measures taken by natural and anthropogenic systems in order to reduce the potential harm caused by climate change or to maximize the positive impacts of current and expected climate change.
  - National Action Program on Climate Change, 2012

Resilience

- The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.
  - UNISDR Terminology on DRR, 2009
- Resilience is a system's ability to maintain its basic structure, function and identity in the face of shocks and changes—to recover and reorganize following a major perturbation such as dzud. A fundamental characteristic of resilient systems is their capacity to learn, adapt and "live with change."
  - Fernandez-Gimenez et al., 2011

Previous studies

- Many researcher and scholars have studied dzud as a natural phenomenon including meteorological characteristics and its impacts on livestock population, the herder families and country's economy, the government role to respond and recovery the dzud, as well as relatively few studies have focused, in depth, on adaptation and resilience in Mongolian pastoral system.
- Many rooms for the study on adaptation to and building resilience for dzud are still available.

Methodology

- Mixed-methods approach employing qualitative and quantitative data collection and analysis techniques
  - interviews, using a combination of closed and open-ended questions and analyzing the responses to draw conclusions,
  - focus groups, household questionnaires,
  - and document review, etc.

Results

- Objectives:
  - Existing adaptation and resilience approaches in dzud in Mongolia will be identified and examined in order to determine which approaches work exceptionally in our case study, dzud.
  - The new and applicable methods and tools of adaptation and resilience could be identified, introduced and recommended at the end of the study.

Limitations

look at the climate adaptation and community resilience on dzud in Mongolia

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THANK YOU!
Q&A

Research proposal "Development of on- and off-grid renewable energy in Mongolia"

Tulga Mendjargal

Contents

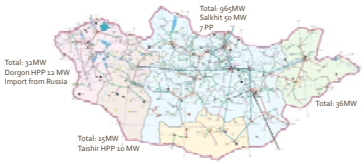
CURRENT STATE OF ENERGY SECTOR IN MONGOLIA

- Central energy system
- Western Energy System
- Eastern Energy system
- Altai-Uliastai energy system
- Dalanzadgad energy system

- Total 965 MW (without OT 150MW)

	Installed energy	Energy Source + Import
Power Plant	87%	77.7%
Small scale RE	0.62%	
Diesel fuel	6%	0.6%
Wind park	4%	0.8%
Hydro PP	2%	0.6%
Import		20.3%

Intergrated power system



Government policy related to RE

- The Parliament and the Government of Mongolia approved
- National Action Program on Climate Change 2011-2021
- National Program on Renewable Energy 2005-2020
- Green Development Policy 2014
- Program on Integrated Energy System of Mongolia
- Energy Policy in Mongolia 2015
- RE Law 2015

General information

- In 2015 328 soum's connected to the grid (from 334)
- 13.7% energy loss from the grid
- 14.4% PPs using their own operation

- **GER Area**: Informal settlement where no basic urban services
  - Household burn row coal for heating and cooking
  - Contributes 60% to UB air pollution

Background and significance

- Difficulties to supply the rural population with electricity
- Strongly dependent on indigenous coal and imported oil
- Centralized electricity supply for soum center is not economically viable

- Depending on the region solar, wind and hydro power can be used for power
- Rural centers and mines are using diesel engine
- 7 coal fired power plants
- Ger dwarfs and nomads using coal for the heating
- Huge RE sources

Ger areas in Ulaanbaatar

In Summer 83% of households use electricity for cooking

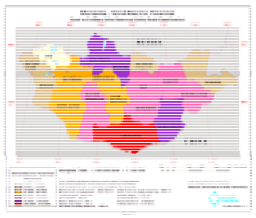
In winter 92% of households use stoves for heating and cooking

Government plan

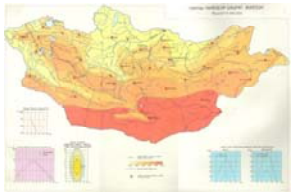
- "National Renewable energy program" and "Green Development Policy" the Government of Mongolia has set the target to increase electricity generation from Renewables:

- **20% RE in 2020**
- **30% RE in 2030**

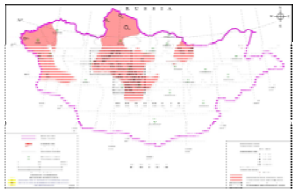
RENEWABLE ENERGY



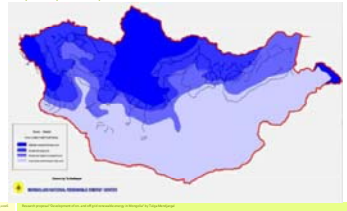
Solar energy potential



Geothermal energy potential



Hydro power potential



RE feed-in tariff 2007-2017

	Hydro			Wind	Solar
	up to 0.5 MW	from 0.5 to 2 MW	from 2 to 5 MW		
Grid-connected	0.045 - 0.06	0.045 - 0.06	0.045 - 0.06	0.08 - 0.095	0.13 - 0.18
Stand alone	0.08 - 0.10	0.05 - 0.06	0.045 - 0.05	0.10 - 0.15	0.2 - 0.3

Prices are given in USD per kWh

Energy Sector in Mongolia – Stake holders

Government
- Ministry of Energy
- Ministry of Environment, Green Development and Tourism
- NREC- National Renewable Energy Sector
- ERC-Energy Regulatory Commission
- NPTG- National power Transmission grid
- NDC- National Dispatching Center
- Thermal power plant's
- Electricity distribution grid

International Organizations
- JICA
- JCM
- ADB
- EBRD
- World Bank
- GEF
- GGGI

New regulations for RE

- 2016.04.07 Explorative and industrial equipment, and its addition tools, spare parts of rechargeable power that exempt from customs duty and value added tax
- 2015.12.18 Equipment, tools and accessories for renewable energy generation to be exempt from value added tax and customs duties
- 2015 users, who is using electricity more than 100 kw/month have to pay 4MNT/kw for RE fund

Renewable energy license holders

Wind Energy
- Aydiner Global 50 MW
- AB Solar Wind 100 MW
- Sainshand Wind Park 52 MW
- Clean Energy Asia 50 MW
- Clean Energy 250Mw
- TBF Energy Zuun 50 MW

Solar Energy
- Desert Solar Power One 30 MW
- Mon Korea Engineering 8 MW
- Solar power International 10 MW
- Rural Electrification 10 MW

TOTAL:610 MW

Wind park Projects

Renewable energy policy

Present Studies

- **ADB Quantum leap**
- **IRENA** (International Renewable Energy Agency)
- Renewable Readiness Assessment
- Global Wind & Solar Atlas Initiative
- **CIF** (Climate Investment Fund)
- Scaling up Renewable Energy Program (SREP)

RE sources

Solar wind diesel hybrid systems aren't working. Reasons:

1. Connected to the grid
2. No capable of HR

2.1. No proper operation and maintenance

2.2. Not enough research
- Wrong technology
- Wrong material

Project list in Mongolia

- Renewable Energy and Rural Electricity Access Project (REAP) 2006
  - Herders electricity Access
  - Soum Center Electricity Service
  - Institutional Capacity Building
- Small-Scale Energy Development in Northeast Asia: Experience, Prospects and Social Implications of Solar PV in Mongolia (ERINA)
- Rural Electrification & Renewable Energy Utilization in Mongolia 2005

Research
- Increase consumption of RE project 2015
- JICA Rural power supply (Worldwide)
- **Lack of research on:**
  - Biomass
  - Geothermal energy

Proposed research study- open

Goal

- Research off grid energy system
  - Diesel to hybrid systems (Environmental friendly)
  - Houses - Solar panels (independent electricity)
  - Houses – Geothermal energy

Goal- West energy system

- Increase 30 MW with RE
  - Solar and Wind
- Research off grid energy system
  - Diesel to hybrid systems (Environmental friendly)
  - Camps and soums - Clean energy

Goal -UB

- Research off grid energy system
  - To cut the operational cost
  - Offices are mainly working during the days
  - Environmental friendly

Methodology (for analyzing off-grid electricity supply)

- Worksheet-based tools (Rural Renewable Energy Analysis and Design Tool)
- Optimization tools to identify and design the least-cost option
- Multi-criteria decision-making (MCDM) tools (environment)
- System-based participatory tools
- Hybrid approaches

Research Points

PRELIMINARY SURVEY
- Research area
  - Research of Energy supply and demand in remote locations (rural areas)
  - Research of Energy supply and demand in mining area
  - Research of Energy demand of industry or office building in the city
- Environmental study of investigation area
  - Weather forecasts
  - Environmental problems like used batteries, clean technology
  - Land issue of mining licensed companies
  - Reduce CO2 and greenhouse gas emissions

DETAILED SURVEY
- Stand-alone system in remote locations (mining area, soums)
- Possibility of stand-alone system or energy saving of office buildings in the city
- Hybrid wind or solar systems with diesel engine
- Research of Energy system development and grid connected home energy system from stand-alone system
- Research of equipment and technology

Analysis of Data collection of energy demand

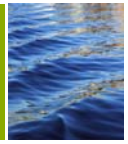
- Analysis of the load and energy production
  - Load of resident
  - Load of factory
  - Load of mining company
  - Mine campuses in the rural areas
  - Mining energy demand in rural areas (mines with and without processing plant)
  - Energy consumptions calculation of diesel engine in rural areas
- Analysis of previous made documents and related international studies and papers

Advisors

- **Energy:**
  - Ph.D ULAM-ORGIL Chojiljav — Associate Professor, Power Engineering School, Mongolian University of Science and Technology, Member of Science and technology committee in Ministry of Energy, Member of Institute of Energy and Economics
- **Mining:**
  - Ph.D BUYANKHISHIG Nemer — Vice president School of Geology and Mining Engineering, Mongolia University Science and Technology
- **Technology and management:**
  - Sc.D TSETSGEE Bayasgalan — Associate Professor, Graduate school of Business, Mongolian University of Science and Technology
  - Ph.D GANCHIMEG Jamsran — Associate Professor, Graduate school of Business, Mongolian University of Science and Technology

Thank you for your attention!

Question?



Ministry of Construction and Urban Development, Mongolia

Formulation of Land Evaluation System for Urban Renewal Projects

(research proposal for ASCI program)

Presenter: Purevdorj ENKHMANDAKH

Senior officer in charge of Land Affairs
Department of Urban Development and Land Affairs Policy

May, 16, 2016. Ulaanbaatar.

CONTENT

Brief introduction of biography

- **Education**
  - *Bachelor of Science* (Land management), *National University of Mongolia*, Ulaanbaatar, Mongolia, 1999 - 2003.
  - *Master of Science* (Urban land use planning), *National University of Mongolia*, Ulaanbaatar, Mongolia, 2004 - 2006.
  - *Master of Engineering* (Urban redevelopment, Land readjustment and International development engineering), *Tokyo Institute of Technology*, Tokyo, Japan, 2009 - 2011.
- **Experience**
  - *Land manager* in charge of urban land use planning, *Urban Planning, Research and Design Institute of Ulaanbaatar Municipality*, 2004-2007.
  - *Officer* in charge of regional and urban planning, *Ministry of Road, Transport, Construction and Urban Development*, 2007-2012.
  - *Senior officer* in charge of land affairs, *Ministry of Construction and Urban Development*, 2012-recent.

Brief introduction of biography

- **International training**
  - *"Seminar on Inter-City Cooperation Platform for Sustainable Cities: Urban Profile and Challenges"*, JICA, Tokyo and Toyama, Japan, (Oct 21 – 30, 2015)
  - *"New town development, construction and labour management"*, KOICA, Republic of Korea, (May 31 – June 20, 2015)
  - *"Intelligent city – Innovative solutions for megacities tomorrow (Smart city - Berlin)"*, Federal Ministry of Foreign Affairs, Federal Republic of Germany, (May 18-23, 2015)
  - *"Affordable housing policy"*, Housing Corporation, Anchorage city, Alaska State, Chicago city, Illinois State, United States of America, (March-April, 2014)
  - *"Urban planning"*, International Urban Training Center, Gangwong province, Republic of Korea, (November 21-30, 2012)
  - *"Strengthening and use of country safeguard systems – regional workshop"*, Asian Development Bank, Philippines, (April 17-20, 2012)
  - *"Comprehensive city planning"*, Tokyo International Center, JICA, Japan, (August 25 - October 30, 2007)
  - *"Seminar on economic development and planning analysis of cities and towns for developing nations"*, Ministry of Commerce, People`s Republic of China, (March 31 - April 21, 2007)

Previous research

Land Readjustment and Appraisal in Ger Area of Ulaanbaatar City

ウランバートル市ゲル地区における土地区画整理手法の適用と評価
プレブドルジ エンフマンダフ

TOKYO INSTITUTE OF TECHNOLOGY
Department of International Development Engineering
Supervisor: Prof. Shinya HANAOKA
Student: Purevdorj ENKHMANDAKH

2011. Tokyo.

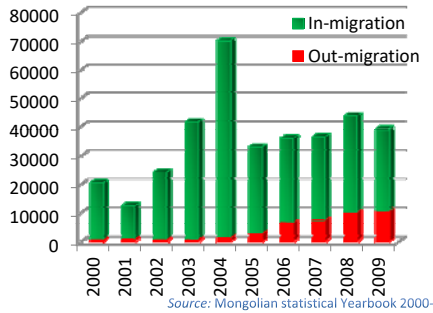
BACKGROUND

Dramatic increase of migration

(from rural to urban)

- Number of migrants: 20-30 thousand per year
- From 2.7 mill, 40 % of total population lives in the capital city

In and out migration of Ulaanbaatar city



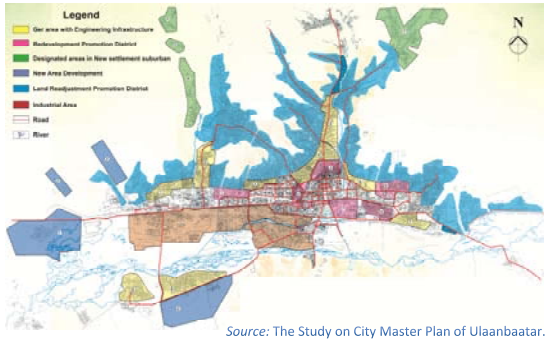
Source: Mongolian statistical Yearbook 2000-2009.

Rapid urban sprawl

(expansion of unplanned Ger area)

- Unpaved, insufficient road network with narrow and dead-end streets
- Disorderly and irregular shaped land lot allocations
- Lack of urban facilities and basic infrastructures (municipal utilities)

Location of GER area in Ulaanbaatar city



Source: The Study on City Master Plan of Ulaanbaatar.

RESEARCH GOAL

Formulate land value assessment methodology for Land readjustment projects to promote increase land use efficiency in Ger area by through "Unur-2" case study.

OBJECTIVES

- To identify Ger area residents` perceptions of needs for basic infrastructure and their willingness for improvement of living environment
- To assess land value of before and after the planning
- To design replotting plan based on land value assessment

METHODOLOGY

Input

Data from the proposed "Unur-2" case study area

Process

Willingness of improvement of the Ger area residents by questionnaire survey

Urban layout planning according to "Mongolian Norms and Ordinance of Building and City planning (BNbD 30.01.04)"

Land value assessment before and after the planning using "Road side value method"

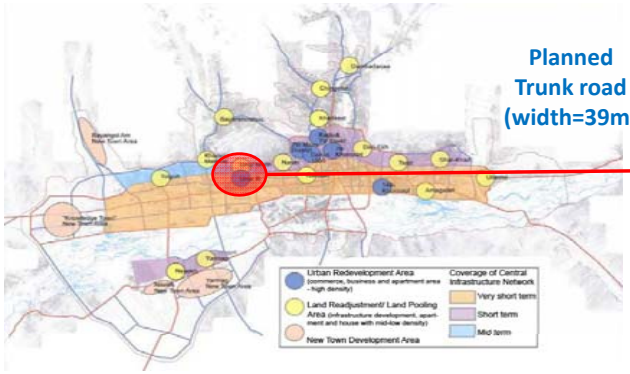
Output

Replotting design based on land appraisal of each land lot

CASE STUDY AREA

- "Unur" Ger Area (Area =238ha) was designated as Urban Renewal Promotion Area.
- "East- west" planned trunk road will be developed as a road project by Municipality.
- Case study area (Area =6.7ha) selected in along side of the planned trunk road.

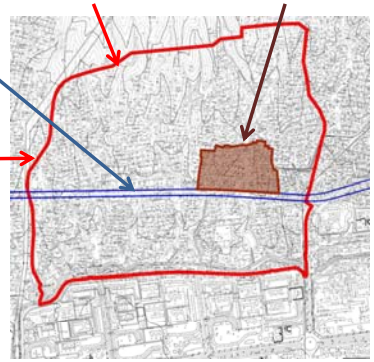
Development orientations of Ger areas



Planned Trunk road (width=39m)

"Unur" Ger area-238 ha

Case study area-6.7 ha

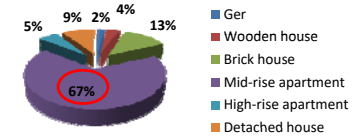


ANALYSIS OF QUESTIONNAIRE SURVEY

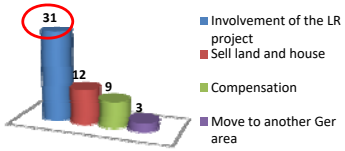
Main purpose of the questionnaire survey

- Identify Ger area residents` perceptions of needs for basic infrastructure
- Willingness of improvements for living environment

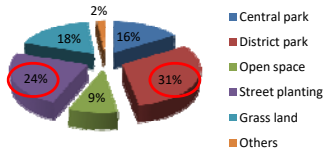
Willingness to change dwelling type



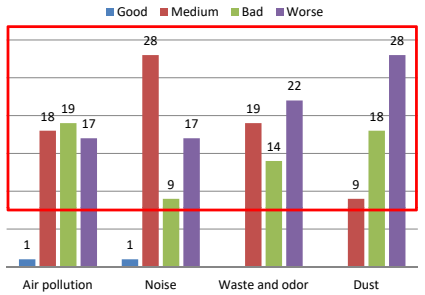
Willingness to involve LR project



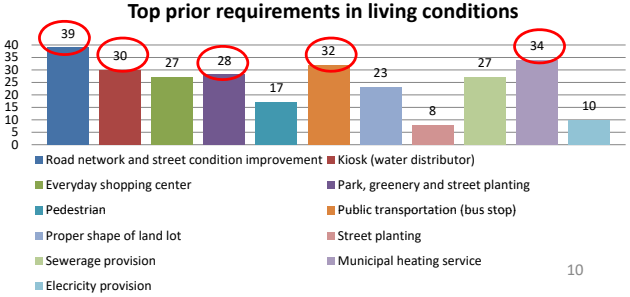
Needs of green space by request



Environmental condition



Top prior requirements in living conditions



BASIC IDEA OF LAND APPRAISAL

1. Road side value method (ROSENKA)

Road side value = **Street coefficient** + **Access coefficient** + **Land coefficient** + **Utility coefficient**

= **[(w-3)/w+∑X]** + **[m(S-s)/(S-R)]** + **(Shape + LUT + legal)** + **(Elect+ Heat+ Water+ Sew)**

Where: F (W) = (w-3)/w+∑X is a street coefficient,

A = m(S-s)/(S-R) is an access coefficient,

L = Shape + LUT + legal is a land coefficient,

U = Elect+ Heat+ Water+ Sew is an utility coefficient.

2. The benefit value of the relevant facilities

The magnitude of the value of benefit arising from the relevant facilities and the highest values of land valuation indicators are defined from the questionnaire survey of case study area.

3. Land market price survey of GTZ in Ulaanbaatar

The decreased value of these indicators is defined for each indicator that significantly influencing land market price and its calculation is based on comparison between with or without their services of 1 m^2 average land price.

The magnitude of benefit value of the relevant facilities

Indicators	Response of questionnaire	Share	Coefficient
Road network with pavement	39	12.4%	1.00
Heating	34	10.8%	0.87
Bus stop	32	10.2%	0.82
Water supply	30	9.6%	0.77
Park	28	8.9%	0.72
Shop	27	8.6%	0.69
Sewage	27	8.6%	0.69
Shape	23	7.3%	0.59
Pedestrian	17	5.4%	0.44
Electricity	10	3.2%	0.26
Street planting	8	2.5%	0.21

INDICATORS AND COEFFICIENT OF LAND APPRAISAL

No.	Item	Condition	Coefficient
Street coefficient			
1	Road width	20m over	0.9-1.0
		10-15m	0.7-0.8
		6-9m	0.5-0.6
		Under 6m	0.3-0.4
2	Pavement	Paved	1.00
		No pavement	0.50
3	Pedestrian	Available	0.44
		Unavailable	0.22
4	Street planting	Available	0.21
		Unavailable	0.10
Access coefficient			
5	Kiosk (water distributor)	Under 50m	0.80
		50-150m	0.50
		150-200m	0.10
		200m over	0.00
6	Daily grocery shop	Under 100m	0.70
		100-250m	0.60
		250-500m	0.20
		500m over	0.00
7	Park and greenery	Under 100m	0.70
		100-250m	0.60
		250-500m	0.20
		500m over	0.00
8	Bus stop	Under 100m	0.80
		100-250m	0.70
		250-500m	0.30
		500m over	0.00

No.	Item	Condition	Coefficient
Land coefficient			
9	Shape	Regular	0.59
		Irregular	0.29
10	Land use type	Commerce	1.00
		Residence	0.57
11	Legal	Ownership	1.00
		Possession	0.63
		Usage	0.35
		No rights	0.00
Utility coefficient			
12	Electricity	Available	0.26
		Unavailable	0.13
13	Heating	Available	0.87
		Unavailable	0.58
14	Water supply	Available	0.77
		Unavailable	0.54
15	Sewerage	Available	0.69
		Unavailable	0.48

PROCESS OF LAND APPRAISAL AND REPLOTTING

Step 1: Confirm basic condition

Step 2: Block valuation (before and after)

Step 3: Calculate value increase

Step 4: Lot valuation before the planning

Step 5: Lot valuation after the planning, and calculation of land area to be distributed

Step 6: Designing the re-plotting plan

STEP 1. CONFIRM BASIC CONDITION

Land balance of the Existing land use and the Planning

- Road area is increased as 1.8 times (4993 m^2)
- Pedestrian, park-greenery and reserved land are newly created

Land use type		Before		After		Notes
		Area (m2)	Share (%)	Area (m2)	Share (%)	
Public land area	Road	6080	9.0%	11073	16.5%	Road will be paved after the project.
	Pedestrian	0	0.0%	4942	7.4%	Paved sidewalks
	Park and greenery	0	0.0%	3044	4.5%	District level park
	Eroded land (municipal area)	14635	21.8%	0	0.0%	Eroded land is existing street including the earth road, sidewalk and ravine.
	Total	20715	30.8%	19059	28.4%	
Private land area		46498	69.2%	40916	62.3%	Ownership
Reserved land area		0	0.0%	7238	9.4%	Public facility and/or financial purpose
Total		**67213**	**100.0%**	**67213**	**100.0%**	

STEP 2. BLOCK EVALUATION

Block Value (Before)

C1: (Total coefficient) x (Block Area)
= 6.34 x 9694m^2
= 61459.96
R1: 26494.10
R2: 18948.04
R3: 20691.12
R4: 39203.92
C2: 13905.04
R5: 31168.20
R6: 31211.76
R7: 32143.08
Total Value = 275225.22

Block Value (After)

C1: (Total coefficient) x (Block Area)
= 9.93 x 8724.6m^2
= 86635.28
R1: 34563.15
R2: 24718.86
R3: 28060.56
R4: 53771.13
C2: 21493.29
R5: 44690.40
R6: 44327.34
R7: 46474.02
Total Value = **385004.03**

STEP 3. VALUE INCREASE

Value Increase = 385004.03 / 275225.22 = **1.399**

STEP 4. LOT EVALUATION BEFORE THE PLANNING

Block ID		C2										Total
Lot ID (Parcel number)		61		62		63		64		65		
Lot area (m2)		330		376		622		545		508		2381
Street Coefficient	Road width (m)	4	0.30	4	0.30	4	0.30	4	0.30	4	0.30	1.5
	Pavement	none	0.50	none	0.50	none	0.50	none	0.50	none	0.50	2.5
	Pedestrian	none	0.22	none	0.22	none	0.22	none	0.22	none	0.22	1.1
	Street planting	none	0.10	none	0.10	none	0.10	none	0.10	none	0.10	0.5
Access coefficient	Kiosk-water distributor (m)	150	0.70	180	0.70	180	0.70	180	0.70	160	0.70	3.5
	Daily shop (m)	310	0.30	310	0.30	330	0.30	350	0.30	370	0.20	1.4
	Park and greenery (m)	none	0.00	none	0.00	none	0.00	none	0.00	none	0.00	0
	Bus stop (m)	500m over	0.00	500m over	0.00	500m over	0.00	500m over	0.00	500m over	0.00	0
Land coefficient	Shape	none	0.29	none	0.29	none	0.29	none	0.29	none	0.29	1.45
	Land use type	residence	0.57	residence	0.57	residence	0.57	residence	0.57	residence	0.57	2.85
	Legal	owned	1.00	owned	1.00	possess	0.63	owned	1.00	owned	1.00	4.63
Utility coefficient	Electricity	connected	0.26	connected	0.26	connected	0.26	connected	0.26	connected	0.26	1.3
	Heating	none	0.58	none	0.58	none	0.58	none	0.58	none	0.58	2.9
	Water supply	none	0.54	none	0.54	none	0.54	none	0.54	none	0.54	2.7
	Sewerage	none	0.48	none	0.48	none	0.48	none	0.48	none	0.48	2.4
Total lot coefficient			5.84		5.84		5.47		5.84		5.74	28.73
Lot value		1927.20		2195.84		3402.34		3182.80		2915.92		13624.10

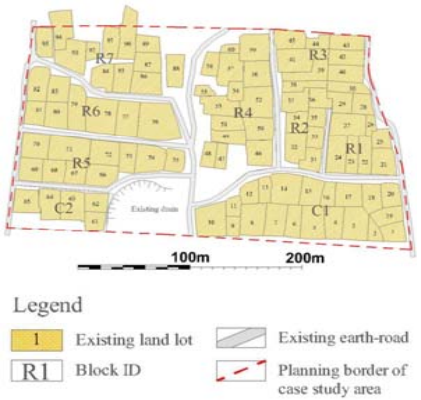
STEP 5. LOT EVALUATION AFTER THE PLANNING AND LAND DISTRIBUTION

Block ID		C2										Total
Lot ID (Parcel number)		61		62		63		64		65		
Land value of per lot (Lot value after project)		2979		3394		5259		4920		4507		21059
Street Coefficient	Road width (m)	38	1.00	38	1.00	38	1.00	38	1.00	38	1.00	5
	Pavement	available	1.00	available	1.00	available	1.00	available	1.00	available	1.00	5
	Pedestrian	available	0.44	available	0.44	available	0.44	available	0.44	available	0.44	2.2
	Street planting	available	0.21	available	0.21	available	0.21	available	0.21	available	0.21	1.05
Access coefficient	Kiosk-water distributor (m)	none	0.00	none	0.00	none	0.00	none	0.00	none	0.00	0
	Daily shop (m)	10	0.70	10	0.70	10	0.70	10	0.70	10	0.70	3.5
	Park and greenery (m)	20	0.70	20	0.70	40	0.70	60	0.70	80	0.70	3.5
	Bus stop (m)	10	0.80	10	0.80	10	0.80	10	0.80	10	0.80	4
Land coefficient	Shape	positive	0.59	positive	0.59	positive	0.59	positive	0.59	positive	0.59	2.95
	Land use type	commerce	1.00	commerce	1.00	commerce	1.00	commerce	1.00	commerce	1.00	5
	Legal	owned	1.00	owned	1.00	owned	1.00	owned	1.00	owned	1.00	5
Utility coefficient	Electricity	available	0.26	available	0.26	available	0.26	available	0.26	available	0.26	1.3
	Heating	available	0.87	available	0.87	available	0.87	available	0.87	available	0.87	4.35
	Water supply	available	0.77	available	0.77	available	0.77	available	0.77	available	0.77	3.85
	Sewerage	available	0.69	available	0.69	available	0.69	available	0.69	available	0.69	3.45
Total lot coefficient			10.03		10.03		10.03		10.03		10.03	50.15
Land area to be distributed (m2)		297.0		338.4		524.3		490.5		449.4		2099.6
Contribution area (m2)		33.0		37.6		97.7		54.5		58.6		281.4
Contribution ratio (%)		10.0%		10.0%		15.7%		10.0%		11.5%		11.8%
Lot value befor the project		1927.20		2195.84		3402.34		3182.80		2915.92		13624.10
Lot area before the project (m2)		330		376		622		545		508		2381

STEP 6. DESIGNING THE REPLOTTING PLAN (KUKAKU-SEIRI)

- All replots should be connected to community access roads.
- All replots should be reshaped to rectangular as possible.
- Location of lot after readjustment shall be allotted with consideration to neighboring relations before readjustment and land usage.
- Location of reserve lands shall be decided according to their purpose on condition that they do not hinder replotting.

Existing land lots **BEFORE** the planning



Replotting design map **AFTER** the planning

CONCLUSION

- The land readjustment approach in Ger area might solve problems of the shortcoming of basic infrastructure provision by involving the separated landowners in development, since they acquire the serviced urban land lots and increased value of land despite the area size reduction.
- The serviced and regularly shaped urban land lot promotes to the rational land use and its marketability.
- The local authorities might gain the profit from which they do not need to purchase overall land lots within the implementation zone.
- Municipality could be able to implement their responsibility of basic infrastructure provision by through land readjustment project in principal of better urban spaces for residents.

Future research idea

- **Background (Problem statement)**
  - Contradiction between *land market price* which is evaluated by land owners and *land acquisition price* from local authorities.
  - *No exact valuation system* for private lands.
  - Land market value is evidently *unstable* in which *lack of land value assessment methodology* for coordination among landowners.
  - long time for *negotiation* and *consensus building*.
- **Literature review (practice and experience of developed countries)**
- **Study of Methodologies and legislature frameworks**
  - Land suitability analysis
  - Land qualitative evaluation
  - Land economic evaluation
  - Land evaluation system based on zoning
- **Proposal of Land Evaluation System for Urban Renewal**

Thank you for your attention